UNIVERSITY OF KWAZULU-NATAL

GREEN SUPPLY CHAIN MANAGEMENT CHALLENGES IN THE SOUTH AFRICAN FAST-MOVING CONSUMER GOODS INDUSTRY: A CASE OF UNILEVER

By

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DECLARATION

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LIST OF COMMONLY USED ACRONYMS

4Rs	Reuse, reduce, recycle and recover
CAQDAS	Computer aided qualitative data analysis software
CFC	Chlorofluorocarbon
CGCSA	Consumer Goods Council of South Africa
CO_2	Carbon dioxide
CPG	Consumer packaged goods
CSR	Corporate social responsibility
DCF	Discounted cash flow
DDM	Dynamic decision making
EMS	Environment management system
FMCG	Fast moving consumer goods
GHG	Greenhouse gas
GSCM	Green supply chain management
IT	Information technology
ITS	Intelligent transportation system
KPI	Key performance indicator
LPG	Liquefied petroleum gas
NGO	Non-governmental organisation
PGD	Product group development
PMO	Project management office
PPE	Personal protective equipment
RDF	Refuse-derived fuel
REM	Recyclability evaluation methods
ROGI	Return on green investment
ROI	Return on investment
SAP	Systems applications products
SCM	Supply chain management
SHE	Safety, health and environment
SOM	Sustainable operations management
SRF	Specified recovered fuel
SRM	Supplier relationship management

SSRM	Sustainable supplier relationship management
UN	United Nations
VSD	Variable speed drives
WCM	World class manufacturing

ABSTRACT

***Background*:** Companies and customers around the world are embracing the importance of environmental sustainability in the production of food that they eat. This poses a challenge to the South African fast-moving consumer goods (FMCG) companies since there are challenges that hinder environmental sustainability activities within their supply chains. Whilst studies have been conducted on green supply chain management (GSCM) challenges, few studies have been conducted on FMCG companies in South Africa.

Purpose: This research study aims to determine the GSCM challenges that Unilever faces; to determine the remedies that Unilever has in place to overcome these challenges; and to determine the benefits that Unilever derives from adopting green supply chain. The challenges were identified through literature and an empirical study at the Unilever-Indonsa factory.

Methodology: This is an exploratory and descriptive study and a case study approach was adopted. The empirical study included semi-structured in-depth interviews with the managers at Unilever and a non-participant, structured observation, to provide insight into the GSCM challenges that Unilever faces, how Unilever overcomes those challenge and the benefits that Unilever derives from GSCM. A non-probability, purposive sampling method was used to select the participating company and participants. Data analysis was conducted using thematic analysis.

Findings: The findings of this research study indicate that the challenges in GSCM implementation can be categorised into four themes derived from use of the conceptual framework for this study. These include green procurement challenges, green manufacturing challenges, green transportation challenges, and product recovery challenges. Green procurement challenges include a lack of knowledge and information sharing among partners and supplier reluctance to change towards green supply chain. Green manufacturing challenges include waste, capacity constraints and pollution, whereas green transportation challenges include carbon emissions and diesel spillage. High energy and water consumption and a lack of knowledge of sustainability were identified as product recovery challenges.

Benefits derived by Unilever when adopting a green supply chain can be categorised into financial benefits, and non-financial benefits. Cost savings opportunities are identified as the financial benefits, whereas non-financial benefits include brand reputation, waste prevention

and reduction, compliance to environmental legislation, better business practices and competitive advantage.

The findings further indicate that the use of an environmental scorecard, auditing, KPIs, energy mapping, rainwater harvesting, bonuses and prices are some of prominent remedies to challenges in GSCM.

Contribution: The field of GSCM is dynamic. There is a dearth of research dealing with GSCM challenges in leading FMCG companies in South Africa. Therefore, it is envisaged that the study of literature and the findings of this research will play a significant role in the field by providing new insights and contributing to the body of knowledge by identifying challenges and areas where these challenges can be addressed.

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CHAPTER 1

INTRODUTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

Economic development activities are carried out in the environment in which we live in order to satisfy our needs. In 1987, the United Nations (UN) published a report titled 'Our Common Future' to facilitate the establishment of environmental sustainability and promote protection of the environment and society, from the negative impact of commercial activities (Brundtland Commission 1987:132). The developmental activities around the world increase the potential negative effect on the natural environment (Brundtland Commission 1987:132). According to this report, sustainable development is "the development that meets the needs of the present generation without compromising the ability of the future generations to meet their own needs" (Brundtland Commission 1987:133).

The Congress of Parties (COP) refers to the UN's climate conferences, where countries around the world meet to share ideas and establish resolutions to encourage a green economy. COP 17 was held in the city of Durban, South Africa from 28 November to 9 December 2011. The South African government formulated legislation to respond to international frameworks on environmental sustainability, compelling fast moving consumer goods (FMCG) companies in South Africa, like Procter and Gamble, Unilever and Nestlé, to be environmentally responsible when conducting their supply chain activities.

In addition, the necessity to adopt and implement green supply chain practices in the operations of the FMCG companies in South Africa has been created by customer concerns for the environment. However, there are many challenges that hamper the success of these green initiatives (Abbasi & Nilsson 2012:48). As a result many companies fail to strengthen and improve green practices. Therefore, collaboration between all stakeholders (internally and externally) in supply chains such as the companies, suppliers, customers and government is needed to facilitate success in the

adoption of green supply chain management (GSCM) initiatives in the South African FMCG industry.

1.2 BACKGROUND OF THE STUDY

According to Srivastava (2011:12), the adoption of GSCM has become a critical requirement for companies to ensure environmental sustainability and improve their image. This is due to the negative impact of economic growth on ecological systems and society, which is likely to result in global warming. The UN has established frameworks such as the Kyoto Protocol (UNFCCC 1997:81) to facilitate the adoption of green initiatives and oblige countries to comply with the environmental standards (UNFCCC 1997:82). The Kyoto Protocol contains internationally binding targets of reducing deforestation, irresponsible disposal of waste and the emission of carbon dioxide to the environment.

The first Earth Summit held in 1992, in Rio de Janeiro, Brazil, is one of the driving forces for the acknowledgement of sustainable development and the acceptance of green practices in the world (UNCED 1992:133). Many governments and customers globally are developing a respectful and more conscious attitude toward environmental sustainability (Srivastava 2007:72). Consequently, many companies and customers globally embrace the implementation of green practices as an important requirement for conducting business today. However, there is a range of challenges faced by FMCG companies in ensuring effective and efficient adoption of GSCM practices in their activities (Abbasi & Nillssen 2012:104). Against this background and for the purpose of this study, GSCM will be examined in relation to four constructs. These are green procurement, green manufacturing, green transportation and product recovery. This study aims to investigate the GSCM challenges that Unilever faces and the remedies they have in place to overcome these challenges, as well as to determine the benefits that Unilever derives from GSCM.

1.3 DEFINITION OF TERMS AND CONCEPTS

Certain significant terms and concepts have been used throughout this dissertation. Table 1.1 provides a list of definitions of these key terms and concepts.

Table 1.1: Definitions of terms and concepts

Terms and Concepts	Definition
Challenges	A challenge is referred to as something that hinders improvement or accomplishment of something. In the context of this study, challenges can include influences such as lack of financial resources or customer interest and high investments costs, which hold back the process of implementing GSCM initiatives in the South African FMCG industry (Beamon 2008:14).
Best practices	According to Wistler (2005:16), best practices can refer to the grouping of the current or existing procedures which facilitate the lowest cost and provide required quality level. These are: processes which provide the shortest cycle time for the required task or deliverable, methodologies that provide beneficial results, processes and activities shown in practice to be most effective and that allow businesses to outperform all competition in a particular business process, and the best possible way of doing something (Wistler 2005:17) In the context of the current study, best practices can be defined as approaches and procedures that can be adopted in relation to environmental sustainability.
Supply chain	Supply chain can be defined as "the integration of topics from manufacturing operations, purchasing, transportation and physical distribution into a unified program and successful

	supply chain coordinates" (Zigiaris 2000:2). "All these activities are integrated into a seamless process linking all the partners in the chain" (Zigiaris 2000:2).
Supply chain management	"Supply chain management (SCM) refers to the management of activities involved in the sourcing of materials, the transformation of these materials into intermediate goods and final products and the transporting of finished products or services to final customers" (Srivastva 2011:32).
Green supply chain management	GSCM includes incorporating environmental standards into SCM activities and corporate procurement decisions along with interactions with suppliers (Gilbert 2009:34). Torres, Nones, Morques and Evgenio (2010:17) maintain that the purpose of green supply chains is to confine waste in manufacturing in order to ensure energy conservation and to prevent disposal of harmful materials into the environment.
Fast moving goods and consumer industry	The FMCG industry, also known as the consumer packaged goods industry, refers to companies that produce products that are sold quickly and consumed on a regular basis (Dobson, Roger, Stephen and Michael 2001:46). It is mainly involved in the manufacturing transportation and marketing of the consumer packaged goods like product categories, such as dairy products, packaged food products and household products (Dobson *et al.* 2001:48).

1.4 RESEARCH PROBLEM/ STATEMENT OF THE PROBLEM

GSCM is increasingly receiving recognition by many South African FMCG companies. However, numerous challenges associated with GSCM hinder transformation from conventional SCM to GSCM (Srivastava 2011:165). Consequently, many companies are unable to comply with government legislation to reduce carbon dioxide emission,

and disposal of waste to the landfill and to meet customer demands for environmentally friendly products.

The relevance of this research study is supported by the fact that customers demand more environmentally friendly products and by government regulations. It is then essential for South African FMCG companies to adopt GSCM instead of the traditional supply chain. In addition, FMCG companies should maintain consistent communication with their suppliers to ensure that environmental sustainability initiatives are implemented at all stages of value chain. Therefore, it is important to carry out this study as it will provide insight into the GSCM challenges that one FMCG company faces (Unilever) and how this company overcomes these challenges.

In light of the importance of GSCM, the following problem statement was formulated:

To determine the GSCM challenges that Unilever faces and how these can be overcome.

1.5 CONCEPTUAL FRAMEWORK

A conceptual framework forms the foundation on which to base a research study. An essential part of the research process is to provide clear definitions of key concepts (Cavana, Delahaye & Sekaran 2000:83). This research study will be based on the GSCM framework (see Figure 1). GSCM refers to the process of ensuring the use of inputs that are not harmful to the environment and of transforming these inputs into finished products that can be recycled, recovered and re-used at the end of their lifecycle, thus creating a sustainable supply chain (Charmaz 2006:45). This framework is concerned with ensuring the incorporation of environmental sustainability into SCM activities. GSCM encompasses all product life cycle stages from the extraction of the raw materials, production, manufacturing and design stages to the product consumption by end user customers and the disposal of the product at the end of its life cycle (BearingPoint 2008:5). The whole product lifecycle is taken into consideration during the GSCM application, since sources of negative impact on the environment can occur at any stage of the supply chain (BearingPoint 2008:5). According to this framework, the central concepts or constructs associated with green supply chain are green procurement, green manufacturing, green transportation and product recovery.

Figure 1 is an illustration of GSCM framework which will be used as a conceptual framework for this study. Each construct will be briefly explained.

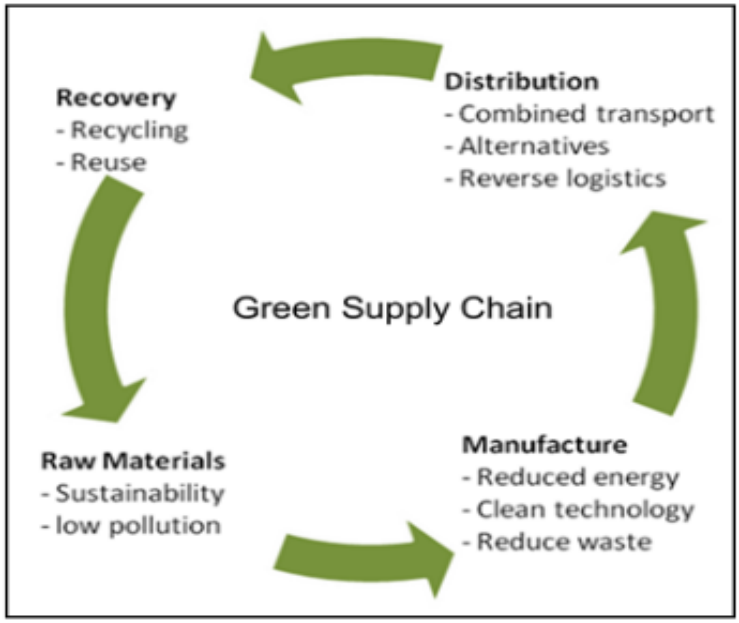

Figure 1: Green supply chain conceptual framework
(Source: Business Performance Improvement Resource n.d.)

1.5.1 Green Procurement

According to Greening Greater Toronto (2011:5), green procurement is the process of selecting products and services that result in the effective minimisation or elimination of negative environmental impact during designing, engineering, packaging and transportation, use and, eventually, recycling or disposal (Greening Greater Toronto 2011:5). The purpose of green procurement is to promote purchasing of environmentally friendly products and services and to set the requirements for environmental sustainability and the selection of suppliers that complies with environmental standards.

1.5.2 Green Manufacturing

Green manufacturing refers to the designing and engineering of products and services using various means of manufacturing and systems that are not harmful to the

environment, that enable the conservation of energy and other natural resources, that are economically feasible and that do not compromise the safety and health of the workers, customers and communities (Gilbert 2009:95). Green manufacturing is aimed at eliminating waste by re-defining the existing production process and involves using resources with low negative impact on the environment. Green manufacturing can improve the corporate image and establish a range of opportunities for reducing costs and meeting environmental standards (Lamming & Hampson 2009:23).

1.5.3 Green Transportation

Green transportation is "a sustainable transportation system that allows for basic access and the development needs of individuals, companies and societies to be met safely and in a manner that is in line with human and ecosystem health" (Gilbert 2009:82). It aims to limit carbon dioxide emissions and waste within the natural environment.

1.5.4 Product Recovery

Product recovery is concerned with retrieving the inherent value of a product when it no longer fulfils the needs of the end-user. Brady (2010:79) maintains that the most economically viable approach to recycling and reusing manufactured goods is product recovery. This is the industrial process whereby worn out products are returned to their original condition and specification. For the purpose of this research study, product recovery will focus on waste reduction, water recovery and energy recovery.

This framework will be used to guide the research study in order to determine the GSCM challenges that Unilever faces and how Unilever overcomes these and to enable recommendations on how these challenges can be overcome.

1.6 RESEARCH QUESTIONS

The following research questions were formulated according to the problem statement:

1. What are the GSCM challenges that Unilever faces?
2. What remedies does Unilever have in place to overcome these challenges?

3. What are the benefits that Unilever derives from GSCM?

1.7 RESEARCH OBJECTIVES

In order to answer the research questions, the following primary objectives are set:

1. to determine the GSCM challenges that Unilever faces
2. to determine the remedies Unilever have in place to overcome these challenges
3. to determine what the benefits are that Unilever derives from GSCM.

The secondary objectives of this study, which will be achieved through a literature review, are as follows:

1. to obtain a perspective of the South African FMCG industry
2. to provide an overview of the scope and concept of SCM
3. to provide an overview of the scope and concept of GSCM
4. to identify important best practices in GSCM (served as a guideline to draw up the interview guide)
5. to identify green procurement challenges (served as a guideline to draw up the interview guide)
6. to identify green manufacturing challenges (served as a guideline to draw up the interview guide)
7. to identify green transportation and distribution challenges (served as a guideline to draw up the interview guide)
8. to identify challenges with regards to product recovery (served as a guideline to draw up the interview guide).

1.8 THE SIGNIFICANCE OF THE STUDY

The findings of this study provide insight into the GSCM challenges that Unilever faces and how Unilever overcomes these challenges. Suggestions are also made regarding how the challenges can be remedied.

The field of GSCM is dynamic. It is envisaged that the study of the literature and the findings of this research will play a significant role in this field by providing new thinking and insights so as to contribute to the body of knowledge. There is a dearth of research on GSCM challenges in leading FMCG companies in South Africa. Therefore, the study will contribute to the present body of knowledge by identifying areas through which the identified challenges can be improved.

1.9 RESEARCH METHODOLOGY

The following sections provide an overview of the research process.

1.9.1 Research Design

The study is exploratory and descriptive and a case study approach has been adopted. An exploratory research study refers to research that mainly intends to gain insight and to become familiar with a specific situation (Bernard & Ryan 2010). Descriptive research is carried out in order to describe and determine the characteristics of the variables that the researcher is interested in (Sekaran 2003:105). The exploratory research assisted in identifying the GSCM challenges that Unilever faces. A case study approach is used with only one company being included in this study. Adopting this research approach was useful as it provided answers to questions regarding the reality of GSCM challenges that Unilever faces.

The exploratory research design enabled the researcher to establish the groundwork that can be used to explain what is being observed by means of existing theory. This research design is essential for this study since it allowed researcher to draw better conclusions. Creswell and Plano Clark (2007:93) maintain that this type of research design is essential for the researcher to gain a better knowledge about the topic in order to improve the research questions and subsequent findings of the research study. In addition, using descriptive research enabled the researcher to explore while enhancing additional information on the similar topic (Denzin 2010:42). The researcher also expanded this understanding by describing what was happening in detail and filling in the missing parts to the data (Bickman & Rog 2009:167).

The empirical research undertaken in this study consisted of conducting semi-structured in-depth interviews using an interview guide with staff at Unilever and observations using an observation check list. The participants included a total of eight managers at Unilever, Riverhorse Valley, Newland East, Durban.

1.9.2 Study site

This research study focuses on Unilever's Indonsa Factory, which is located in KwaZulu-Natal, Durban, Newlands East, Riverhorse Valley.

1.9.3 Data collection methods

Empirical data was collected by means of semi-structured in-depth interviews using an interview guide and an observation checklist to conduct observations in the factory.

1.9.3.1 Interview guide

The interview guide consisted of open-ended questions. An open-ended question is a partially structured question for which potential responses are not proposed, and the participant is free to answer it in his or her own words (Oppenheim 2009:83). This provided in-depth responses and allowed the participants to freely express their views regarding GSCM challenges.

1.9.3.2 Data quality control

Data quality control is concerned with the reliability, trustworthiness and credibility of the information that is gathered; it assesses the results obtained in terms of their similarities and checks if the results may be generally applicable to the entire population (Sekaran 2003:35). It looks at the trustworthiness and reliability of the instruments that have been used to collect the data.

Reliability refers to an evaluating measure which tests accuracy and consistency of a measuring instrument in measuring whatever concept it is designed to measure (Sekaran 2003:36). The researcher pre-tested the interview guide with the academics in the school to make sure that ambiguous and unclear questions were eliminated before

conducting the empirical study. In addition, consistency and accuracy were maintained during the interviews. This would contribute to the trustworthiness of the results of the study.

Validity refers to the "criteria for evaluating the effectiveness of measures which test how well an instrument measures the particular concept it is supposed to measure" (Sekaran 2003:36). Validity helps to ensure that the research has not diverged from the main objectives and what the reality is for the entire population of a study (Welman, Kruger & Mitchell 2011:142). This ensured that questions asked during interviews were relevant to the research topic since the questions were based on the research objectives and conceptual framework used in the study (Welman *et al.* 2011:142). Interviews were recorded and subsequently transcribed verbatim in order to make sure that all the important information was captured. Face validity was used to ensure that open ended questions in the interview guide were not in contradiction with research questions.

1.9.4 Defining the target population

A target population is "the entire aggregation of respondents that meet a designated set of criteria" (Sekaran 2003:35). The study used a sample from the target population rather than a census which would count all the elements in the population. In the present study, the target population included one FMCG company operating in South Africa.

This study was based at Unilever's Indonsa Savoury Factory. The main reason for choosing Unilever as a sample is that it is one of largest FMCG companies in South Africa and its impacts on the lives of many people through the broad range of brand categories provided and vital played role in the South African economy.

Unilever's South African head office is located in Durban (La Lucia), South Africa. Unilever manufactures and sells various product categories worldwide. These products consist of more than four hundred brand names and are used by two billion people (Unilever 2012). The company has played a major role in ensuring that environmental sustainability is facilitated in food production by formulating a sustainable living plan aimed at reducing negative environmental impact caused by carbon emissions and

irresponsible disposal of waste to the landfill. The company is also committed to reduce its packaging and ensuring sustainable sourcing (Jones & Miskell 2007:73).

1.9.5 Data obtained

The findings of this research indicate that the GSCM challenge can be categorised into four themes derived from the conceptual framework. These include green procurement challenges, green manufacturing challenges, green transportation challenges and product recovery challenges. Green procurement challenges include lack of knowledge and information sharing among partners and supplier reluctance to change to a green supply chain. Green manufacturing challenges include waste, capacity constraints and pollution, whereas green transportation challenges include carbon emissions and diesel spillage. High consumption of energy and water resources and the lack of knowledge on sustainability were identified as product recovery challenges. Additionally, other challenges indicated during the empirical study include high initial investment and costs, limited visibility over supplier activities, poor communication, poor legislation on green procurement, lack of partnering with local suppliers and an information gap among managers.

Benefits derived at Unilever when adopting a green supply chain can be categorised into financial benefits and non-financial benefits. Financial benefits include cost saving opportunities, whereas non-financial benefits include brand reputation, waste prevention and reduction, compliance with environmental legislation, better business practices and competitive advantage.

Some of the main remedies for GSCM challenges include an environmental scorecard, auditing, key performance indicators (KPIs), energy mapping, rainwater harvesting, bonuses and prices.

1.9.6 Data analysis

Data analysis can be defined as the process that is utilised by the researcher to minimise or to reduce the large amount of collected data so as to make sense of it (Sekaran 2003:67). Thematic analysis was used to analyse data obtained during the empirical study at the Unilever-Indonsa factory. Thematic analysis is an approach to dealing with

data that involves the creation and application of 'codes' to data (Creswell & Plano Clark 2007:103). Coding can be defined as the creation of categories in relation to data, the grouping together of different instances of datum under an umbrella term that can enable them to be regarded as of the same type (Corbin & Strauss 2008:83).

1.10. ETHICAL CONSIDERATIONS

Ethics basically refers to rules or standards for governing the relationship between people to benefit all concerned, with shared respect for the needs and wants of all individuals involved (Hitt 2008:34). The ethics committee at the University of KwaZulu-Natal issued an ethical clearance letter before any form of primary research was undertaken. (A copy of the ethical clearance approval letter is attached as Appendix A.) Before the interviews commenced, participants were provided with an informed consent form to complete and sign, noting that they were participating of their own free will and that they were free to withdraw from the study at any stage should they wish to. Any confidential information obtained from the research will be kept confidential and the participants were assured of anonymity.

1.11 LIMITATIONS OF THE STUDY

The limitations of this study are outlined as follows:

(i) Only one company in the FMCG industry (Unilever) was included in this study. Other FMCG companies operating South Africa did not partake in this study. Therefore, the findings of this research cannot be generalised to all companies in the FMCG sector in South Africa.

(ii) GSCM challenges were identified through the literature review and semi-structured in-depth interviews with participants at Unilever in the supply chain department. It is suggested that not all challenges in the green supply chain may have been identified.

1.12 STRUCTURE OF DISSERTATION

Chapter 1	**Introduction and background** This chapter provides an introduction and outlines the study. The chapter deals with the background of the study, definition of terms and concepts, the conceptual framework, research problem/statement of the problem, research questions, research objectives, the significance of the study, research methodology, ethical considerations, limitations of the study and structure of the dissertation.
Chapter 2	**Supply chain, supply chain management and green supply chain management** This chapter focuses on reviewing the existing literature in order to explore and describe the concepts of supply chain, SCM and GSCM.
Chapter 3	**Green supply chain management best practices and challenges** This chapter deals with a range of best practices necessary for the effective implementation of green supply chain, and the potential challenges that hinder GSCM activities in the South African FMCG industry.
Chapter 4	**Research methodology** This chapter outlines the research methodology in order to achieve the research objectives of this study. This includes the research design, the research approaches/paradigms, the study site, the target population, the sampling method, the sample size, the data collection methods, the data quality control, the data analysis, ethical considerations and limitations of the study.
Chapter 5	**Analysis, presentation and discussion of the findings** This chapter focuses on analysing the data and presents the results of the

	empirical data collected from the research sample during the empirical field research. The data is interpreted, discussed and conclusions are drawn in relation to the objectives of the study.
Chapter 6	**Recommendations and suggestions for future research** This chapter provides a summary of the study and presents the main findings in relation to the objectives of the study. The chapter concludes with recommendations for further research.

1.13 SUMMARY

This chapter has provided an introduction and outline of the research study. The chapter has dealt with the background of the study and has provided definitions of terms and concepts and the conceptual framework. A problem statement and research questions have been formulated. The research objectives were derived from the research questions.

One company, namely Unilever in Durban, was selected for this study because of its importance to the economy. For the purpose of this study, the scope was narrowed down to the sustainable sourcing of raw materials (green procurement), green manufacturing, green distribution or green transportation and product recovery. In order to achieve the aim of the study, the research methodology was explained, with an overview of the research design, the significance of the study methodology, ethical consideration, limitations of the study, and structure of dissertation being dealt with.

The concepts of supply chain, SCM and GSCM will be discussed in chapter 2.

CHAPTER 2

SUPPLY CHAIN, SUPPLY CHAIN MANAGEMENT AND GREEN SUPPLY CHAIN MANAGEMENT

2.1 INTRODUCTION

This chapter aims to review the relevant literature so as to gain a broader understanding of various green supply chain challenges facing the South African FMCG industry. The chapter defines and discusses GSCM, identifying a range of differences between GSCM and conventional SCM. This provides a thorough understanding and awareness of various costs and benefits of implementing GSCM compared to conventional SCM.

The following sections focus on describing the basic concepts in SCM.

2.2 BASIC CONCEPTS IN SUPPLY CHAIN MANAGEMENT

2.2.1 Description of supply chain management

The global market is characterised by high customer expectations for quality products and most companies develop products with shorter life cycles. Therefore, companies are compelled to incorporate supply chain practices in their operation in order to gain a competitive advantage and satisfy customer demands. This requires the advancement of information technology (IT) and effective communication among partners within the value chain. The implementation of supply chain practices could enhance the image and the reputation of a brand and ultimately the entire company.

According to Monczka, Trent and Handfield (2005:53), SCM consists of a range of supply chain networks that encapsulates various activities within and outside the organisation and which are entirely responsible for the supply of products from its origin to the end-user or a customer. SCM provides companies with a range of methods that can be used to effectively form relationships with suppliers to enhance communication. It also presents ways to integrate all the partners in the value chain such as suppliers, warehouses, customers, manufacturers, so that products are manufactured

and transported at the correct or desired quantity, of the right quality, to the right locations, and at the right time, in order to reduce costs of the entire system, while satisfying customer requirements in the best possible way (Zigiaris 2000:4).

This is best portrayed by a generic supply chain model which is illustrated in Figure 2.1

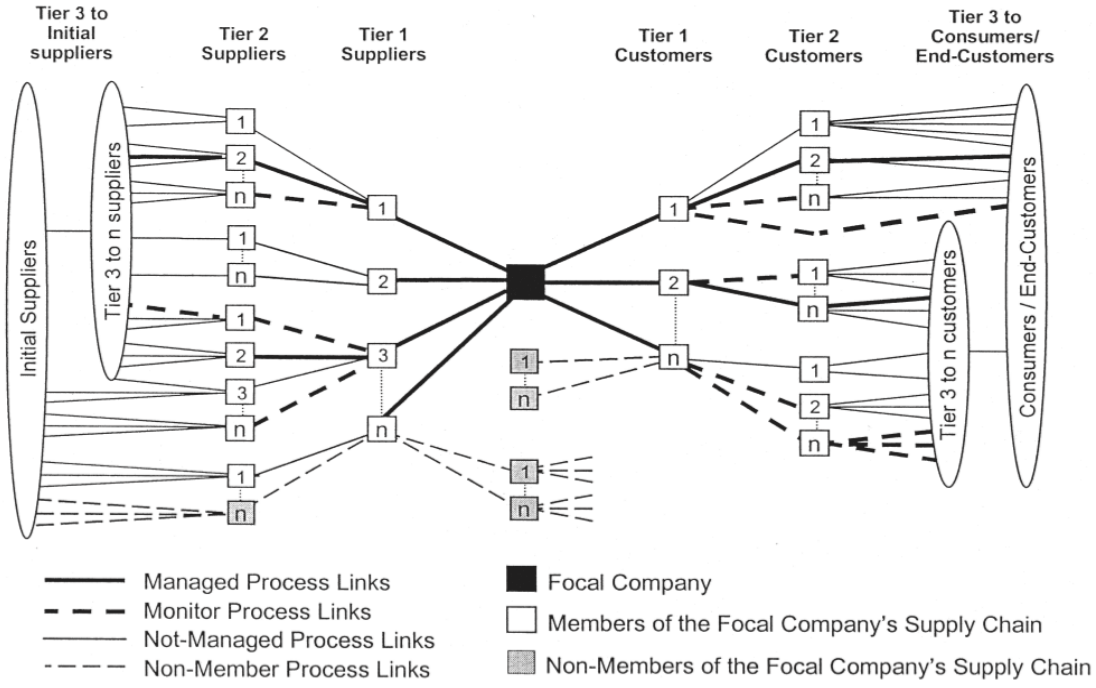

Figure 2.1: Generic supply chain model

(Source: Lambert 2008:54)

2.2.1.1 Main flows in a supply chain

The flows that take place in a supply chain are divided into three forms. Firstly, the product flow moves in two ways between the point of origin and the end-user customers as a result of return of products due to obsoleteness, damage and repairs. Secondly, the information flow in the value chain disseminates important information related to the product upstream and downstream to ensure effectiveness, efficiency and on time delivery to the third tier customers. Finally the finance and cash flow is in the form of the backward flow and the forward flow due to returned products (Langley, Cloyle, Gibson, Novack & Bardi 2009:45).

2.2.1.2 The focal company, suppliers and customers

The focal company refers to a company which is used as a frame of reference for analysing the supply chain. The first tier suppliers and first tier customers are the direct suppliers and direct customers to the focal company (Wisner, Tan & Leong 2012:47). The suppliers of the first-tier suppliers are therefore the second-tier suppliers of the focal company and the suppliers of the first-tier customers are considered to be the second-tier customers and so on.

2.2.1.3 Efficiency and effectiveness of supply chain

From an organisational perspective, efficiency refers to a measure of productively different resources utilised to accomplish a goal or objective. Langley *et al.* (2009:90) maintain that organisations are efficient when they ensure that the utilisation of resources is minimised. Effectiveness refers to the measure of the appropriateness of the goal or objective pursued by the organisation (Jones & George 2011:134).

From a supply chain perspective, efficiency refers to the extent to which the total costs of meeting the demands of the customers is reduced; effectiveness is the degree to which expectations of the customer service are met or exceeded (Langley *et al.* 2009:94). A customer service definition refers to the 'Seven-R's Rule', that is, "having the *right* product, in the *right* quantity, in the *right* condition, at the *right* place, at *right* time, for the *right* customer, at the *right* cost" (Langley *et al.* 2009:94).

2.2.1.4 Supply chain structure

A supply chain structure can vary in many ways. For example, it can include direct relationships where an individual manufacturer deals with the final customer, a complicated network which involves the numerous suppliers of raw materials, manufacturers, distribution channels and logistics channels. According to Lambert (2008:24), a number of characteristics, such as product portfolio, supplier base, manufacturing processes, customer base, logistics scope, applications and systems used, determine the complexity of the supply chain.

2.2.2 Supply chain integration

Langley *et al.* (2009:94) argue that the supply chain can be regarded as a sequence of initiatives that must facilitate information sharing and execute co-ordination to achieve a seamless, uninterrupted flow of goods, services, information and cash through the pipeline. The supply chain crosses boundaries of individual organisations to span the connected functions of all stakeholders within the total supply chain. This integration of supply chain activities implies that it is important to ensure that the supply chain functions as one extended organisation to meet the demands of the ultimate customer (Langley *et al.* 2009:96).

There are numerous activities involved in the supply chain. These include the procurement of raw materials, inbound transportation, on-site inspection of quality, the receiving and storage of the materials, material control and order processing, planning, manufacturing and scheduling, warehousing activities, shipping, outbound transportation, returns handling, salvage and scrap disposal and service to the end user customer (Monczka *et al.* 2005:76).

2.2.3 Concept of total supply chain management

SCM can be defined as "the integration of supply chain activities through improved supply chain relationships to achieve a sustainable competitive advantage" (Monczka *et al.* 2005:89). The concept of total SCM is as a result of the need for integration and coordination of a range of activities in supply chain and information sharing throughout internal functions within the organisation (Monczka *et al.* 2005:89). Components of total SCM are illustrated in figure 2.2.

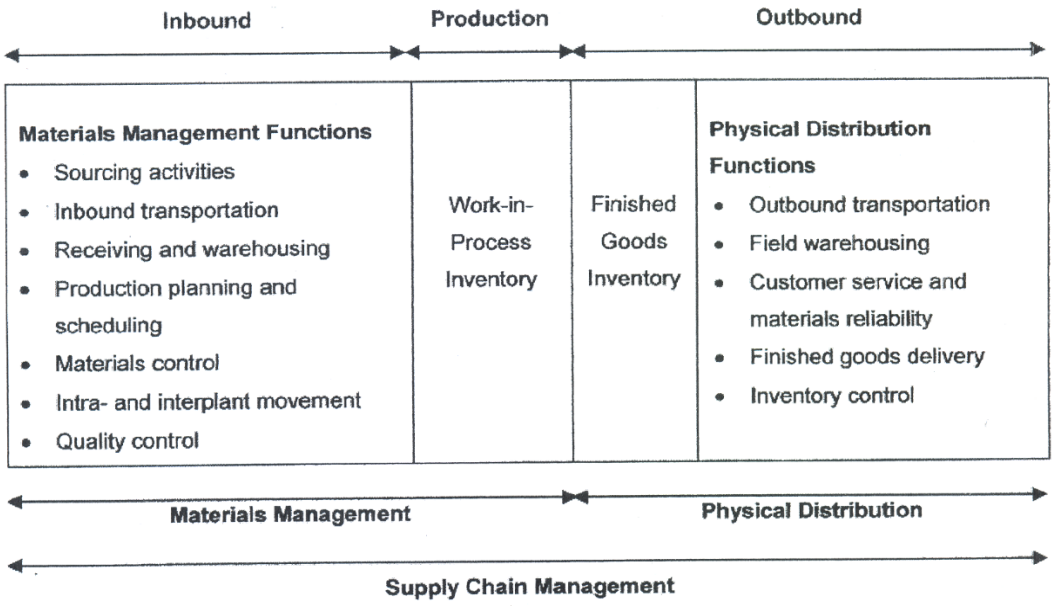

Figure 2.2: Components of total supply chain management

(Source: Monczka *et al.* 2005:83)

The main aim of total SCM is to proactively manage the two-way movement and co-ordination of information, products and related services, from the supplier's suppliers through the various intermediary organisations out to the customer's customers (Borade & Bansod 2010:156). Operations include the various processes used in the transformation of inputs flowing from upstream supplier network into downstream customers (AlKhidir & Zailani 2009).

According to Langley *et al.* (2009:44), the outbound logistics of a supplier upstream will be the inbound logistics of its immediate customer downstream in the supply chain. Therefore, the integration and the synchronisation of the logistics functions of all supply chain the members are essential requirements for the efficient and effective SCM (Langley *et al.* 2009:46).

2.3 THE OVERVIEW OF THE FMCG INDUSTRY

The FMCG industry contributes significantly to the gross domestic product of South Africa and it is one of the largest sectors in the South African economy. Mazzarotto (2001:11) argues that the CGCSA is the representative body of the entire South African

FMCG industry. This body was established in 2002 and it represents 12 000 FMCG companies across the value chain of consumer goods. This includes the retail sector, the wholesale and production sector (CGCSA, n.d.). The CGCSA promotes engagement between stakeholders in the industry, and represents the interest of the FMCG industry to government and other stakeholders. The most recognisable names in this sector include Unilever, Coca-Cola, Procter and Gamble, Pepsi and Nestlé. Fast moving consumer goods are "products which have a quick turnover, and have relatively low cost and are replaced within one year" (Kotler 2003:14).

The FMCG industry has experienced an increased use of sales promotion activities globally in recent years. Products that require frequent purchase and have a low unit value are regarded as consumer purchased goods. Therefore, there is less customer loyalty to the business, less investment on the part of a consumer and impulse buying (Kotler 2003:34). According to the CGCSA (n.d.), there are fewer penetration levels, low operating costs and a well-established distribution network in the FMCG industry. Unlike other sectors, the FMCG industry has not slowed down since the financial crisis in 2008. The industry has continued to grow as it meet daily customer demands (Mazzarotto 2001:16).

2.4 ENVIRONMENTAL IMPACT IN A TYPICAL SUPPLY CHAIN

The establishment of a company's supply chain can be followed back to the natural environment in which the raw materials that flow through the entire supply chain are obtained. At the end of the supply chain the end-user or final customer is found (Monczka *et al.* 2005:99). This section focuses on the environmental impact of SCM activities. Figure 2.3 illustrates the environmental impact in a typical supply chain.

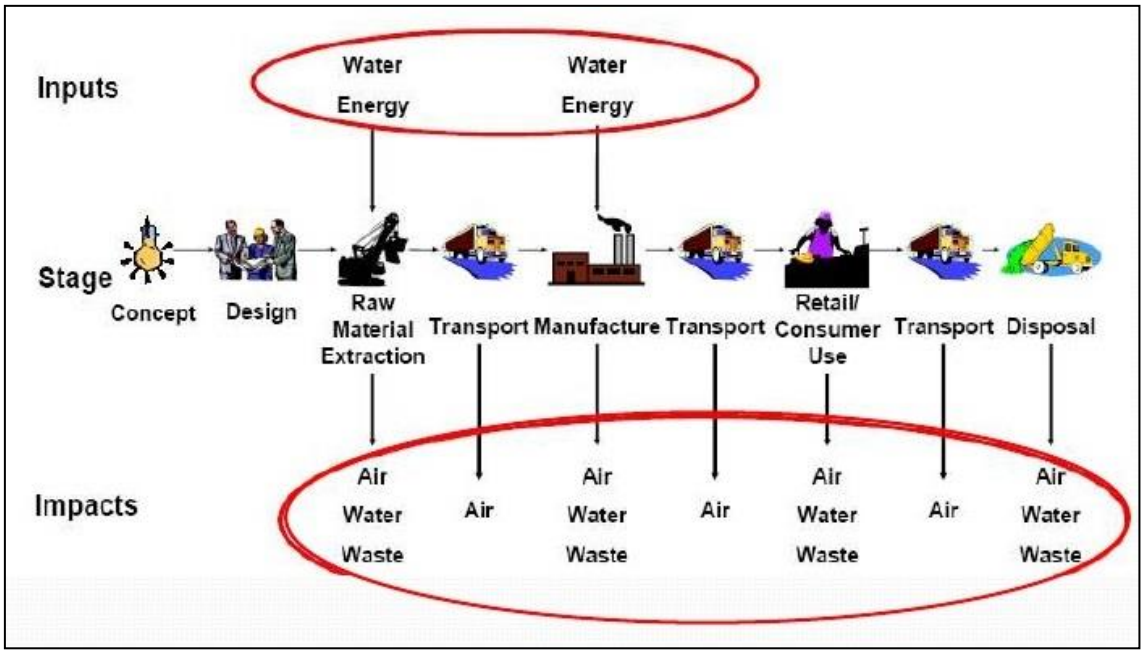

Figure 2.3: Environmental impacts in a typical supply chain

(Source: Zhu, Sarkis, & Lai 2008:43)

The negative environmental impact of production, supply and product consumption may be grouped into the use of energy (fossil fuels), the use of raw materials (water, wood, minerals) and waste (excessive use of energy, water and raw materials, discharge of pollutants, biodiversity destruction, product disposables) (Wills 2009:27). Effective sustainable development requires capable maintenance of the natural resources or the conservation of global life-support systems in order to produce energy and raw material resources to manufacture products and maintaining capabilities of the natural environment to eradicate waste produced during production, supply of the products and the consumption thereof (Monczka *et al*. 2005:85).

Kumar and Chandrakar (2012:68) maintain that the supply chain network of a company consists of a range of activities, internally and externally of the company, that may contain natural resources such as water, raw materials, and fossil fuels and produce different types of waste product, such as used chemicals, that is thrown away in the landfill. All these activities impact negatively on the natural environment (Kumar & Chandrakar. 2012:72). The adoption and integration of green practices can play a vital role in eliminating or reducing the negative impact of these activities. These green activities or practices include conservation of water and energy, recycling and reusing of products at the end of their life cycle.

A ‘green supply chain’ can be defined as “the process of using environmentally friendly inputs and transforming these inputs through change agents whose by-products can improve or be recycled within the existing environment” (Torres *et al.* 2010:19). This process facilitates the development of products that can be recovered, recycled and re-used at the end of their life-cycles, thus ensuring greening practices in supply chain.

2.5 GREENING THE SUPPLY CHAIN

The effective development and incorporation of essential GSCM into total supply chain activities is reinforced by the creation of appropriate green supply chain strategies and efficient and effective best practices of SCM.

2.5.1 Green supply chain strategy

A green supply chain strategy is essential since it helps companies to make decisions that do not have a negative impact on the environment. This strategy offers various opportunities for organisations to be cautious of the impact of a number of activities, products and services on the environment. According to Olson (2010:95), the purpose of a green supply chain strategy is to achieve improved environmental performance and to improve effectiveness and efficiency in the utilisation of such resources as water and energy in order to eliminate the negative impact commercial activities on the society and the natural environment and to enhance the opportunities for achieving quality of life.

In addition, Olson (2010:53) maintains that decision making and policy formulation, business strategy, corporate strategy and operational strategy can be influenced by green supply chain strategy. A green supply chain strategy allows the alignment of the core business level strategies with the organisation’s vision, mission and values. It ensures that better decision making is achieved, and finally ensures that a range of goods and services are provided to the market in a way that is more environmentally friendly (Olson 2010:56).

2.5.2 Green supply chain management

Srivastava (2011:8) defines green supply chain management as "integrating environmental thinking into total SCM, including product design, material or product sourcing and selection, manufacturing processes or operational processes, marketing and delivery of the final products to the consumers, as well as end-of-life management of the product after its useful life". According to Walker, Di Sisto and McBain (2008:245), the green supply chain concept "covers all phases of a product's life cycle, from the extraction of raw materials and materials (green procurement) through the production (green manufacturing), distribution phases (green transportation, to the product disposal and recovery at the of product's life cycle".

These descriptions of GSCM contain central concepts or constructs associated with green supply chain. These include the sustainable sourcing of raw materials (green procurement), green manufacturing, green distribution or green transportation and product recovery. Figure 2.4 provides an illustration of what green supply chain consists of and since this is used as the framework for this study as it is important to identify dimensions that make up green supply chain.

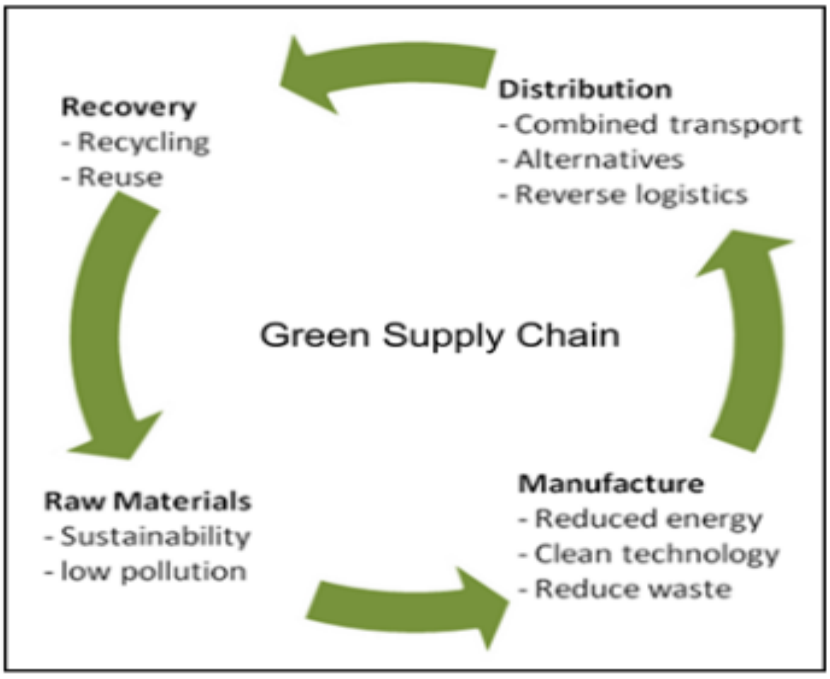

Figure 2.4: Green supply chain framework

(Source: Business Performance Improvement Resource n.d.)

2.5.2.1 Green Procurement

Green procurement is referred to as the process of selecting products and services that result in the effective minimisation or elimination of a negative environmental impact during designing, engineering, packaging and transportation, use and eventually, recycling or disposal (Greening Greater Toronto 2011:5). The purpose of green procurement is to promote purchasing of environmentally friendly products and services and to set the requirements for environmental sustainability and the selection of suppliers that complies with the environmental standards. Environmental improvements can be achieved by making purchasing decisions with environmental impact in mind. This can also reduce costs since the process of green procurement is part of a broader value chain (McKenzie 2004:12).

McKenzie (2004:35) maintains that green procurement improves a company's competitiveness and creates a "shared value" that advances the economic and social circumstances in the societies within which it operates. There are numerous benefits or payback that green procurement provides. These include:

- *Environmental stewardship*. The implementation of a green purchasing strategy shows that a company has a well-established environmental stewardship strategy and it is committed to meet local, regional and global objectives with regards to environmental sustainability, for example, minimising emissions of carbon dioxide (CO_2) and other greenhouse gases (GHGs), eliminating air pollution and reducing ground, water and noise pollution (Ninlawan, Seksan, Tossapol & Pilada 2010:34). The adoption and implementation of green procurement function allows companies to be prepared to meet requirement of the current and future environmental legislations.
- *Cost reduction*. Companies could gain cost reduction and improve revenues when implementing greening initiatives in their purchasing function. Although there is a perception that environmental sustainability activities requires high initial investment, in reality, there is often a lower total cost of ownership of green products due to lower operation costs. For example there is no need for maintenance and replacement since the green products are often more durable. Also, there is less utilisation of natural resources such as energy and water (Greening Greater Toronto 2011:7).

- *Risk reduction.* Green procurement provides high risk reduction opportunities which encourage companies to switch to environmentally sustainable procurement. Risks that may translate to financial losses can be avoided when buying greener products or services. These risks include, for example, buying products which contain toxic chemicals and the company image and reputational risks related to partnership with suppliers who do not have good environmental track records. All these risks can be avoided through green procurement function.
- *Revenue growth.* Customers prefer green products and services since they reflect the company's commitment to protecting the natural environment and it is linked to corporate social responsibility. Hence, revenue growth, brand image, competitive edge, customer satisfaction and customer loyalty will be realised as customer requirements for green products are accommodated.
- *Soft impacts.* There are numerous less tangible benefits of green procurement since these are very difficult to quantify. These are 'soft effects', such as employee and supplier commitment, improved employee awareness about environmental sustainability, efficiency and improved brand image and reputation.

2.5.2.2 Green Manufacturing

Green manufacturing can be defined as "production processes which use inputs with relatively low environmental impacts, which are highly efficient, use little water and cause little or no pollution" (Lamming & Hampson 2009:24) Green manufacturing can also be referred to as the designing and engineering of products and services using various means of manufacturing and systems that are not harmful to the environment, that enable the conservation of energy and other natural resources, that are economically feasible and that do not compromise the safety and health of the workers, customers and communities (Hosseini 2007:15). The purpose of green manufacturing is to reduce the use of raw materials as this directly reduces the amount of waste at the manufacturing stage. The reduction of CO_2 emissions is another important benefit of green manufacturing.

There are two ways of reducing emissions. These include control and prevention (Ghobakhloo, Tang, Zulkifli & Ariffin 2013:54). Control entails trapping, storing, treating and disposing of emission and effluents by the use of equipment for controlling

emission. Prevention involves reducing, changing or preventing emissions and effluents by facilitating effective housekeeping, substitution of resources and implementing recycling initiatives (Zhu & Sarkis 2010:87). Green manufacturing can ensure raw material cost reduction, improve efficiency in production, improve the image of the company and eliminate occupational expenses (Ninlawan *et al.* 2010:36).

The aim of green manufacturing is to eliminate waste by re-defining the existing production process and involves using resources with low negative impact on the environment. Green manufacturing can improve corporate image and establish a range of opportunities for reducing costs and meeting environmental standards (Torres *et al.* 2010:84).

2.5.2.3 Green transportation

Green transportation is "a sustainable transportation system that allows basic access and the development needs of individuals, companies and societies to be met safely and in a manner that is in line with human and ecosystem health" (Gilbert 2009:114). Naidoo (2014:24) defines transportation as transportation service that has a lesser or reduced negative impact on human and the natural environment when compared with competing transportation services that serve the same purpose. The purpose of green transportation is to limit CO_2 emissions and waste within the natural environment, promote conservation, using the natural resources in a sustainable manner, and to use transportation that produces lower GHG emissions (Ghobakhloo *et al.* 2013:34). The following are some examples of practices which ensure that green considerations are taken into account during the procurement of transportation services: the evaluation of the environmental status of the potential supplier; informing and educating suppliers in matters of the environmental sustainability; and addressing environmental sustainability matters in the written contract of transportation procurement (Zhu & Sarkis 2010:117).

2.5.2.4 Product Recovery

Product recovery is concerned with retrieving the inherent value of a product when it no longer fulfils the desired needs of the end-user customer. Product recovery is the most economically viable approach to reusing, remanufacturing and recycling worn-out goods. Reuse can be defined as using an item more than once (Zhu & Sarkis 2010:94). According to Ghobakhloo *et al.* (2013:38), product recovery entails traditional reuse when the item is used again for the same function and new-life reuse when it is used for

a different function. Remanufacturing can be defined as "the repairing, refurbishing, or overhauling of an item in order to extend the life of and achieve value from the original core unit" (Evans & Denney 2009:41). The effective remanufacturing management may result in improving the product from its current condition to that of a condition acceptable for reuse.

Recycling can be defined as "the processing of used materials or waste into new products to prevent the waste of potentially useful materials" (Ninlawan *et al.* 2010:32). AlKhidir and Zailani (2009:182) argue that recycling results in the "reduced consumption of virgin raw materials, reduced energy use, reduced air and water pollution through decreasing the need for conventional waste disposal, and lower GHG emissions". Product recovery is the industrial process where worn out products are renewed to their original condition and specification. For the purpose of this research study, product recovery will focus on waste recovery, energy recovery and water recovery (Evans & Denney 2009:43). Product recovery is one of the important constructs of the conceptual framework.

This framework was used to guide the research in order to provide answers to the research questions.

2.5.3 Differences between green supply chain and conventional supply chain management

There are various differences between GSCM and conventional SCM. GSCM is concerned with both ecology and the economy as a goal, whereas conventional SCM typically focuses on the economy as the one and only objective. GSCM considers the effects of toxic substances in the environment, whereas conventional SCM does not (Torres *et al.* 2010:132). An understanding of the differences between these concepts will help FMCG companies to do proper forecasting and planning for the additional resources and equipment that will be required for the implementation of GSCM.

The main differences between GSCM and SCM are summarised in Table 2.1

Table 2.1: Differences between the green supply chain management and conventional supply chain management

Characteristics	Green Supply chain management	Conventional Supply Chain Management	Authors
Objectives	Ecological and economic	Economic	Gilbert (2009); Torres *et al* (2010); AlKhidir & Zailani (2009); Zhu & Sarkis (2011)
Ecological optimisation	High ecological impact	Integrated approach Low ecological impact	
Supplier selection criteria	Ecological aspects Long term relationship	Price switching Short term relationship	
Cost pressure	High	Low	
Flexibility	Low	High	
Speed	Low	High	

(Source: Various sources as listed in Table 2.1)

2.6 POTENTIAL DRIVING FORCES FOR THE ADOPTION OF GREEN SUPPLY CHAIN MANAGEMENT

The driving forces to adopt green supply chain activities can be regarded as those factors that motivate companies to undertake environmental sustainability activities (Walker, Di Sisto & McBain 2008:124). There are some foundational driving forces in the implementation of greening practice; these include global warming, rapid climate change and scarce resources, such as water and energy. The drivers of environmental sustainability, both internal drivers and external drivers. The internal drivers are the factor that encourages green initiatives within the organisation and the external drivers include factors outside of the organisation such as customers, regulations from government, competitors, society and suppliers (Walker *et al.* 2008:124).

The potential driving forces for the adoption of greening activities as identified in the literature reviewed are depicted in the Table 2.2 and discussed in the following sections.

Table 2.2: Potential driving forces for the adoption of GSCM practices

Potential driving forces for adopting supply chain greening practices	Internal/external driver
Top management leadership, commitment and support	Internal
Environmental regulations and legislations	External
Enhancement of corporate image and brand equity	External
Realisation of ROI through sales increase	Internal
Realisation of ROI through cost savings	Internal
Development of innovative technologies, processes and products	External
Pressure from competitors actions	External
Pressure from consumers and lobby groups	External
Pressure from supply chain members	External
Reduction in risk of disruptions in energy and raw material supply	External
Reduction in legal risks	External
Increase in disclosure requirements for sustainability policies and practices	External

2.6.1 Top management leadership, commitment and support

Top management plays a major role in addressing issues related to environmental sustainability. Therefore, effective leadership, as well as full commitment and support from the top management, is crucial in driving or encouraging the formulation of green strategy and the implementation of green activities. Top management commitment and support in the adoption of green practices is likely to enhance the success of green strategy formulation and implementation (BearingPoint 2008; Walker *et al.* 2008; Lee & O'Marah 2011:13). Top management leadership, commitment and support is an internal driver in the adoption of green practices.

2.6.2 Environmental regulations and legislations

Government legislation and regulation regarding environmental sustainability is a prominent driver in the adoption of GSCM, especially in businesses that are proactive

with regard to the regulatory compliance requirements (Evans & Denney 2009:48). Regulation by government has the ability to hold companies accountable and responsible for negative environmental impact. The complexity and quantity of legislation related to customer protection and environment conservation around the world continues to increase. There are several market-based instruments established by governments globally to minimise emission of carbon dioxide in the natural environment and to reduce waste disposal in landfills (BearingPoint 2008; Walker *et al.* 2008; Lee & O'Marah 2011). The environmental regulations and legislation established by government to reduce negative environmental impact is an external driving force in the adoption of green practices.

2.6.3 Enhancement of corporate image and brand equity

Many companies globally are concerned about their image with regard to their customers, as a bad image can influence the bottom line of a business. Therefore, the adoption of greening practices can be an effective strategy to improve corporate image and brand equity. An improvement in corporate image could result in an increase in sales, customer loyalty and profitability (BearingPoint 2008; Walker *et al.* 2008; Lee & O'Marah 2011). Enhancement of corporate image and brand equity is an external driving force in the adoption of green supply chain.

2.6.4 Realisation of return on investment through sales increase

According to BearingPoint (2008:4), the adoption of a green supply chain can improve return on investment (ROI) and satisfying customers. Also the introduction of a green product may enable companies to break into new markets and attract new customers from competitors who are not making an effort to implement environmental sustainability practices (BearingPoint 2008; Walker *et al.* 2008; Wills 2009; Lee & O'Marah 2011). Realisation of ROI through increasing sales is an internal driving force.

2.6.5 Realisation of return on investment through cost savings

The adoption of environmental sustainability activities can help companies realise ROI through the elimination of costs and expenses associated with the management of waste, air pollution, hazardous materials and water discharges, as well as the elimination of costs through water, energy and fuel conservation. Cost savings can also be realised by minimising costs of waste disposal to the landfills (BearingPoint 2008; Walker *et al.* 2008; Lee & O'Marah 2011). Realisation of ROI through cost savings is an internal driver to the green supply chain adoption.

2.6.6 Development of innovative technologies, processes and products

Companies have considerable opportunities to minimise their negative environmental impact as a result of their supply chain activities. These may include various innovations aimed at facilitating the redesigning of products, processes and methods used to conduct operations (Walker *et al.* 2008; Jolly 2010; Lee & O'Marah 2011). Development of innovative technology, process and products is mainly an external driving force in the adoption of environmental sustainability.

2.6.7 Pressure from competitors' actions

Actions of competitors can be considered to be an important driving force for implementing greening initiatives in a company that seeks to achieve competitive advantage and performance improvement. Hence, companies may be compelled to change their technology, equipment and manufacturing process to enable the implementation of a green supply chain, thus gaining competitive advantage (Lee & O'Marah 2011:87). Pressure from competitors' actions is an external driver to adopting a green supply chain.

2.6.8 Pressure from consumers and lobby groups

Customer demands for environmentally friendly products can be an important driving force, which compels companies to adopt green practices in their supply chain. The requirements for the disclosure of ingredients used to manufacture a product can trigger implementation of green practices (BearingPoint 2008:148; Lee & O'Marah 2011:87).

Pressure from customers and lobby groups is an external driver in the adoption of environmental sustainability practices.

2.6.9 Pressure from supply chain members

Cooperation and relationships with supply chain partners can improve management of issues related to environmental sustainability. Relationships among the stakeholders in the supply chain can create push factors towards green procurement, green manufacturing, green transportation and distribution, and product recovery (BearingPoint 2008:71). The buyer's environmental sustainability requirements can compel suppliers to comply with environmental standards by eliminating waste, reducing GHG emissions and avoiding the use of hazardous raw materials. Pressure from supply chain members is mainly an external driving force to adopt green practices.

2.6.10 Reduction in risk of disruptions in energy and raw material supply

Adoption of environmental sustainability is essential for the reduction of disruption in the supply of raw materials, such as energy and water (Lee & O'Marah 2011:47). Government legislation and regulation of emissions and waste disposal will continue to increase (Young & Dhanda 2013:234). Hence, environmental sustainability activities are essential to eradicate risk of interrupted supply of raw materials. Reduction in the risk of disruptions in energy and raw material supply is an external driver in the adoption of environmental sustainability practices.

2.6.11 Reduction in legal risks

Many companies around the globe avoid the risk of being held accountable and responsible for negative impacts on the environment as a result of their products. A clear understanding of government environmental legislation and regulations can assist companies to assess legal risks and penalties for not complying with legislation and regulations (Walker *et al.* 2008; Lee & O'Marah 2011:74). A reduction in risks for non-compliance to environmental sustainability regulations and legislation is mainly an external driving force in the adoption of green supply chain.

2.6.12 Increase in disclosure requirements for sustainability policies and practices

A significant increase in disclosure of issues related to environmental sustainability and associated business risks was triggered by pressures from shareholders, customers and non-governmental organisations (NGOs) on environmental sustainability. A significant number of companies understand the importance of disclosure of their sustainability policies and processes in order to portray a positive corporate image to society (BearingPoint 2008:172; Walker *et al.* 2008; Lee & O'Marah 2011:76). An increase in disclosure requirements for sustainability policies and practices is an external driving force in the adoption of greening practices.

2.7 POTENTIAL BENEFITS OF ADOPTING GREEN SUPPLY CHAIN MANAGEMENT PRACTICES

A benefit can be defined as "something that improves or promotes or the measurable improvement resulting from an outcome that is perceived as an advantage by one or more stakeholders" (OGC 2009:134). Hence it is essential that something that is considered as a benefit results in some form of improvement. Benefits can be tangible or intangible. Tangible benefits can be considered as those improvements that can be measured and quantified. On the other hand, intangible benefits are qualitative in nature and very difficult to measure and quantify (Ravi & Shankar 2012:281). The potential benefits of adopting GSCM practices as identified from the literature are depicted in Table 2.3 and discussed in the following sections.

Table 2.3: Framework of potential benefits of adopting green supply chain practices

Potential benefits of adopting supply chain greening practices	**Tangible/ intangible benefit**
Improved agility	Tangible
Financial performance	Tangible
Improvement in corporate image with shareholders and the public	Intangible
Improvement in supplier relationships	Intangible
Sustainability of resources	Tangible
Lowered costs and increased efficiency	Tangible
Product differentiation and competitive advantage	Intangible
Adapting to regulation and reducing risks	Tangible
Improved quality and products	Tangible
Alignment of business processes	Tangible

2.7.1 Improved agility

The implementation of GSCM enables the mitigation of various risks and facilitates rapid innovations (Tsai & Ghoshal 2008:273). Wu and Hang (2009:34) argue that agility of supply chain is generally defined as a business wide capability that acknowledges structures of the organisation, mind-sets and process in the logistics and information systems. Supply chain agility overall is all about the ability to adapt to change (Tsai & Ghoshal 2008:274). The key aim of supply chain agility is to ensure a quicker response to fluctuations in the supply of materials or customer demand and to ensure uninterrupted supply chain activities (Srivastva 2011:23). Therefore, adoption of GSCM is essential to promote agility.

2.7.2 Financial performance

Notwithstanding sufficient proof to the contrary, there is a myth that there are additional costs or expenses incurred when going green (Zhu & Sarkis 2011:73). The lack of a methodical approach and disengagement in the change thinking that is vital for the establishment of green supply chain are some of the factors that lead to this myth. However, an important GSCM benefit includes better financial performance by organisations (Yu Lin 2009:143). Srivastva (2011:33) argues that businesses are able to ensure cost savings by eliminating or minimising the negative environmental impact of their business processes. It is essential to implement environmental policies in order to improve financial performance. Financial performance is a tangible benefit of GSCM.

2.7.3 Improvement in corporate image with shareholders and the public

The adoption of GSCM practices can put the organisation on the leading edge and improve competitive advantage against its rivals. Environmental sustainability policies and strategies enable companies to avoid future violation of environmental regulations and legislations (Zhu & Sarkis 2011:32). Improvement in corporate image with shareholders and the public is an intangible benefit.

2.7.4 Improvement in supplier relationships

The adoption of environmental sustainability practices can increase business engagement and strong relationships with supply chain stakeholders (Tsai & Ghoshal 2008:26). Collaborations and strategic alliances with suppliers is an essential enabler in greening the supply chain. This requires the facilitation of training and development among all stakeholders in the supply chain including suppliers (Zhu & Sarkis 2011:48). Improvement in supplier relationships is an intangible benefit.

2.7.5 Sustainability of resources

The adoption of GSCM can support and enhance sustainable and profitable use of productive resources of the company. It is therefore essential to incorporate environmental sustainability thinking into the decision making process of the business in order to allow companies to purchase eco-friendly materials that will be transformed

into finished products through manufacturing initiatives (Tsai & Ghoshal 2008:27). Customer requirements are a prominent driver or motivation for companies to change to GSCM. This comprises different activities and programs that are of value to the customers and that they are willing to pay for. It is essential that the company's internal business strategy informs and identifies the role of environmental stewardship (Ravi & Shankar 2012). Sustainability of resources is a tangible benefit.

2.7.6 Lowered costs and increased efficiency

According to Ravi and Shankar (2012:273), GSCM entails the elimination and minimisation of waste by reducing costs and enhancing efficiency. Effective management of suppliers and resources can result in reduced costs of production and recycling can be facilitated and encouraged (Ravi & Shankar 2012:273). Greening practices can improve efficiency in the utilisation of resources, while ensuring that there is a reduction in costs. Also, hazardous substances can be minimised, thus upholding environmental legislation and regulations. Lowered costs and increased efficiency is a tangible benefit.

2.7.7 Product differentiation and competitive advantage

The implementation of GSCM enables an organisation to differentiate products from those of competitors by incorporating green practices in the manufacturing, thus gaining a competitive advantage and new profitable consumers for the company. It reinforces the image of the brand and improves a positive reputation in the market place (Lamming & Hampson 2009:48). Digalwar and Metri (2010:58) maintain that GSCM is one of the many buzz words recently being used by many businesses as they attempt to ensure absolute product differentiation by satisfying the requirements of their consumers. Product differentiation and competitive advantage is an intangible benefit.

2.7.8 Adapting to regulations and reducing risks

The adoption of green supply chain practices by an organisation can minimise the risk of being prosecuted for not complying with the various environmental standards and for using unethical practices (Ravi & Shankar 2012:31). The companies that do not have

eco-friendly supply chain activities suffer from the carbon emission tax that is imposed by the government. Therefore, this would suggest that they really need to re-assess their sources of supply and manufacturing options, including from where to purchase and where to manufacture, as this is bound to change the cost effectiveness and efficiency of the supply chain (Digalwar & Metri 2010:74). Adapting to regulations and reducing risks is tangible benefit.

2.7.9 Improved quality and products

Companies that manufacture products which are advanced by technology and are environmentally friendly will find that improved quality and products will enhance the image of the company and reputation of the brand in the consumer's mind (Ravi & Shankar 2012:239). The European Commission report 2008 states that manufacturers who seek to cultivate environmental sustainability are spreading their efforts through the supply chain, to engage their suppliers both in the upstream and downstream to ensure participation of distributors and customers (Ghobakhloo et al. 2013:73). Tsai and Ghoshal (2008:38) maintain that upstream environmental cooperation improves process-based performance, for example, greater delivery and better adaptability from suppliers. In the downstream relationship, with consumers and distributors, the manufacturing process may result in improvements to products, such as durability, improved conformance and improvements in specifications. Improved quality and products is a tangible benefit.

2.7.10 Alignment of business processes

According to AlKhidir and Zailani (2009:293), GSCM includes policies of negotiating with clients and the suppliers, which leads to better and effective alignment of business processes and principles. It is vitally significant for the companies to identify suppliers who embrace GSCM practices and bring them on board. The adoption of GSCM thus provides a company with the foundation on which policies, contracts with its suppliers and customers can be negotiated. This negotiation facilitates the alignment of the

business processes and company's principles (AlKhidir & Zailani 2009:93). Alignment of business processes is a tangible benefit.

These ten potential benefits are not exhaustive. They will be used as the basis to develop the interview guide in order to collect empirical data for exploring the main benefits of adopting green supply chain practices in the South Africa FMCG industry.

2.8 SUMMARY

The literature review has focused on collecting data to provide insight into GSCM challenges in the South African FMCG industry. The following sections were covered in this chapter: basic concepts in SCM; an overview of FMCG industry; the environmental impacts of a typical supply chain; the differences between GSCM and conventional SCM; and, the potential driving forces for the adoption of GSCM. The conceptual framework is essential to develop and design the interview guide which was used during the interview stage. The resulting data was then analysed in terms of the objectives of the research study.

The literature review focused on collecting information from secondary sources from reputable academic and research institutions, scholarly articles, previous studies, sustainable reports of various companies and websites.

A supply chain of a company can be seen as a pipeline for ensuring effective and efficient flow of products or services, information and financial resources from suppliers to customers, and vice versa, through the organisation (Langley *et al.* 2009). A company's supply chain includes various activities that may consist of natural resources, such as water, fossil fuel, energy and raw materials, and may produce waste that is harmful to the natural environment, such as disposal of non-biodegradable packaging to the landfill, emission of carbon dioxide and disposal of spent chemicals. All of these have a negative environmental impact (Kumar & Chandrakar 2012:88). The integration of environmental sustainability and green practices can be adopted to reduce or eliminate the negative effect of these activities on the natural environment. This implies the integration of greening practices and environmental sustainability initiatives

in the various stages of supply chain, such as procurement, manufacturing, transportation and product recovery.

The literature review identified twelve potential driving forces for effective adoption of GSCM practices, three of which were internal and twelve of which were external. Potential benefits of adopting green supply chain practices were identified. The respective framework for potential driving forces and benefits were also used to draw up the interview guide.

The next chapter (Chapter 3) provides insight into the best practices necessary for the effective implementation of green supply chain, and the potential challenges that hinders GSCM activities in the South African FMCG industry.

CHAPTER 3

GREEN SUPPLY CHAIN BEST PRACTICES AND CHALLENGES

3.1 INTRODUCTION

This chapter reviews the relevant literature to provide insight into green supply chain best practices that are appropriate for the South African FMCG industry. Potential GSCM challenges that hinder the implementation of greening practices are also explored together with two frameworks of GSCM best practices and eleven green supply chain challenges.

The two frameworks of (1) best practices and (2) challenges were used as the basis for designing the questions in the interview guide which was used during the data collection process at Unilever.

3.2 GREEN SUPPLY CHAIN BEST PRACTICES THAT ARE APPROPRIATE FOR THE FMCG INDUSTRY

The green supply chain best practices appropriate for the FMCG industry and identified in the literature are dealt with under this section. These best practices are shown in Table 3.1 followed by a brief discussion of each practice.

Table 3.1: Framework of green supply chain best practices

Green supply chain best practices	Internal/ external
Adoption of green procurement	internal
Green manufacturing	internal
Facilitating green transportation and delivery	external
Promoting product recovery to minimise waste	Internal
Promoting green marketing	Internal
Producing environmentally friendly products	internal
Aligning green supply chain objectives with the business objectives	Internal

Evaluating or assessing supply chain as a single life cycle system	Internal
Improving customer awareness about environmentally friendly products	Internal
Using green supply chain analysis as a catalyst for innovation	Internal
Focusing on source reduction to reduce waste	Internal
Supporting corporate social responsibility	Internal
Managing usage of energy and water	Internal

3.2.1 Adopting green procurement

Green procurement involves forming strong relationships with the suppliers with the aim of producing eco-friendly or environmentally friendly products. Suppliers play a major role in ensuring that the environmental sustainability initiatives of a company succeed (Ninlawan *et al.* 2010:45). Therefore, it is important that FMCG companies hold their suppliers of raw materials accountable and responsible from a sustainability perspective. Suppliers can be monitored by scrutinising all the supply chain stages in order to eliminate components that cause potential risk to human health and thus remove all hazardous products from the shelves (Zhu, Sarkis & Lai 2009:106).

Green procurement enables the manufacturing of environmentally friendly products (Ninlawan *et al.* 2010:46). It is advisable to look beyond the boundaries of the factory when reviewing a company's business process. Therefore, a company will be able to find sustainable suppliers who can supply environmentally friendly materials without compromising the quality and at low cost (Srivastva 2011:84). Thus a greening initiative can begin before the raw materials reaches the site.

Companies can change to GSCM in various ways; however, it is essential to note that effective greening initiatives require strong leadership with full commitment. Hence, top management support should be enhanced to provide resources that will enable environmental sustainability in procurement (Ninlawan *et al.* 2010:52).

3.2.2 Promoting green manufacturing

Gilbert (2009:24) argues that manufacturing activities have contributed to global warming unintentionally and have resulted in a decrease in the ozone layer. Therefore, the consequences of the industrialisation have affected the environment over the century (Ninlawan *et al.* 2010:47). According to Kumar and Chandrakar (2012:29), emissions of GHGs into the environment are as a result of the widespread activities of private enterprises for the commercialisation of supplies to allow for a modernised lifestyle. They also have an unfavourable impact on the utilisation of natural resources. Environmental disasters caused by the negligence of many businesses have roused the concern and awareness of the public (Reagan & Shankar 2012:124).

To respond to the accidents that occur in the environment, it is now a requirement that companies operate their businesses sensibly (Morelli 2011:56). This practice of responsible business is termed "corporate social responsibility", which refers to business methods that are concerned with society's well-being (Sarkis 2009:85).

According to Torres *et al.* (2010:143), better air quality is one of the major benefits derived from the adoption of green manufacturing. Many customers make their purchasing decisions based on a company's environmental stewardship by using green manufacturing facilities and plants. Global warming is one of the environmental consequences of GHGs. Global warming is "a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants". Hence, some customers boycott companies that do not have environmental sustainability practices. The implementation of greening practices is likely to improve a company's bottom line (Morelli 2011:42). Green manufacturing can be viewed as an internal greening practice.

3.2.3 Facilitating green transportation

There is an increase in carbon emissions and transport energy consumption due to increasing volumes of transportation activities globally that outweigh the improvements in vehicle efficiency (AlKhidir & Zailani 2009:46). Hence, the adoption of green transportation is likely to minimise carbon emissions. Green transportation includes

using fuel and energy efficient modes of transportation, the use of lower carbon transportation energy sources, alternative transportation modes and integration of land use and transportation, and optimising the existing system, which includes the use of technology such as intelligent transportation system (Ninlawan *et al.* 2010:112). Green transportation is likely to be accomplished by stipulating policies regarding behaviour such as the use the natural air (windows) instead of air conditioning in low speed situations (AlKhidir & Zailani 2009:46).

Transportation operation is an important area to consider from an environmental sustainability and a cost-reduction perspective. Transportation is known to deplete fossil fuels and emit carbon dioxide (Young & Dhanda 2013:43). FMCG companies could save costs and eliminate the negative environmental impact of transportation by using alternative fuels, routing and changing scheduling. The most widely used logistics methods for reducing costs and eliminating a negative environmental impact in transportation and logistics operations include backhauling, monitoring load size, reducing packaging weight, strategically placing of the distribution centres and using scheduling technologies to improve efficiencies in transportation (Ninlawan *et al.* 2010:48). Facilitating green transportation and delivery is an externally focused greening practice.

3.2.4 Promoting product recovery to minimise waste

According to Ravi and Shankar (2012:7), the implementation of product recovery could reduce operational costs and maximise efficiencies by using environmentally friendly, recycled materials during the manufacturing process. In addition, FMCG companies could obtain financial gain and achieve environmental benefits by recycling, reusing and reducing solid waste materials rather than disposing them in the landfill (AlKhidir & Zailani 2009:23). Packaging contributes significantly to land pollution. Therefore, co-operation between suppliers will play a major role in eliminating solid waste as a result of packaging (Zhu, Sarkis & Lai 2008:273). Companies can show commitment to their greening practice by, for example, creating incentives for customers to reuse shopping bags. Promoting product recovery to minimise waste is an internally focused greening practice.

3.2.5 Encouraging green marketing

According to Srivastva (2011:127), green marketing refers to the ethical and social responsibility requirements in marketing which has emerged as a response to increased environmental challenges and a global increase in a concern about protecting consumer rights, and a concurrent growth of organised movements to address environmental trends in such a way that people will be protected and assured of a clean and safe environment in which to live. Companies can implement greening marketing to reflect the company's commitment to green supply chain (Oslon 2010:34). Promoting green marketing is an externally focused greening practice.

3.2.6 Producing environmentally friendly products

Companies that manufacture products that are both technically advanced and environmentally friendly may find that this enhances the image of the company and reputation of the brand in consumers' minds (Ravi & Shankar 2012:23). Kumar and Chandrakar (2012:56) state that manufacturers who seek to cultivate environmental sustainability spread their efforts through the supply chain, engaging their suppliers upstream and downstream to ensure the participation of distributors and customers. Zhu, Sarkis and Lai (2009:105) maintain that upstream environmental cooperation improves process-based performance, for example, greater delivery and better adaptability from suppliers. In the downstream relationship, with consumers and distributors, the manufacturing process may in the long run result in improvements in product, such as durability, improved conformance, improvements in specifications and the products being environmentally friendly (Serkis 2009:34). Producing environmentally friendly products is an internally focused greening practice.

3.2.7 Aligning green supply chain objectives with business objectives

Jharkharia and Shankar (2011:69) maintain that many companies regularly describe green supply chain objectives and the goals of business independently. This may result in companies describing their supply chain objectives without being thoughtful concerning the corporate case and evaluating such objectives. This could also lead to

unclear or contradictory communications in the company where the objectives may be inconsistent with green supply chain objectives (Zhu, Sarkis & Lai 2009:37). The alignment of green supply chain objectives with business objectives is an internally focused green supply chain practice.

3.2.8 Evaluating or assessing supply chain as a single life cycle system

A traditional supply chain includes a variety of business procedures connected to form a network, with one procedure or process resulting in another so that a system is established (Srivastva 2011:116). The rationale of the system considers the supply chain to consist of activities that have outputs acting as inputs to other activities, therefore enabling understanding at a deeper level of the system in order to find pathways to initiate effective changes (Hosseini 2007:71). Evaluation or assessment of the supply chain as a single life cycle system is an internally focused greening practice.

3.2.9 Improving customer awareness about environmentally friendly products

Customers need to be informed about green initiatives that are undertaken within the company and what steps customers need to take so that they can minimise waste (Young & Dhanda 2013:12). It is advisable for companies to create awareness among customers by establishing promotion activities on environmentally friendly products. Customer awareness could increase preference for buying green products, which will improve the reputation of the company and increase sales volumes (Zhu, Sarkis & Lai 2008:50). Improving customer awareness about environmentally friendly products is an externally focused greening practice.

3.2.10 Using green supply chain analysis as a catalyst for innovation

The analysis of a green supply chain offers a chance to review the procedures, materials, and concepts of the operation. It also targets misused material, wasted energy or effort and resources that are underutilized (Lamming & Hampson 2009:47). Beamon

(2008:78) found that companies that seek to initiate change in order to facilitate a greener supply chain review all their processes in the business in order to identify areas where the adoption of a greener outlook could truly increase their business competitiveness. The use of green supply chain analysis as a catalyst for innovation is an internally focused GSCM practice.

3.2.11 Focusing on source reduction to reduce waste

Re-use and recycling are waste management processes which emphasise the management of waste material once it has been generated (Abbasi & Nilsson 2012:22). Source reduction on the other hand, insists on the elimination, prevention and minimisation of wastage throughout production instead of managing wastage after it has been created. This enables efficient utilisation of the available resources by determining how materials are utilised (Serkis 2009:83; Srivastva 2011:96). Focus on source reduction to reduce waste is an internally focused GSCM practice.

3.2.12 Supporting corporate social responsibility

Oslon (2010:37) argues that corporate social responsibility (CSR) is an approach that companies use to integrate the economic, social and environmental aspects of their activities. It is therefore essential for FMCG companies to report on CSR and inform customers of their environmental goals, policies and targets as this is an effective way to ensure sustainable development (Oslon 2010:37). The engagement of internal and external stakeholders needs to be strengthened to ensure accessibility and transparency in environmental matters. It is also good environmental practice to publish the company's CSR report to show commitment on environmental sustainability (AlKhidir & Zailani 2009:84). Supporting corporate social responsibility is mainly an internally focused practice.

3.2.13 Managing utilisation of energy and water

The management of energy and water utilisation could increase financial efficiencies and reduce the carbon footprint of a business (Zhu, Sarkis & Lai 2009:122). Besides reducing the costs of energy consumption and the carbon footprint, best practices for refrigeration have many positive impacts. Furthermore, the management of water usage and protection of water supplies have become a priority in every country. Countries around the world face scarcity of water. Therefore, the conservation of water might have a positive impact on the business and the environment (Morelli 2011:174). The management of efficient and effective water utilisation could also reduce costs of operation and improve efficiency in operation (Abbasi & Nilsson 2012:112). Managing both the usage of energy and water is an internally focused practice for greening supply chain.

3.3 POTENTIAL GREEN SUPPLY CHAIN MANAGEMENT CHALLENGES

According to Beamon (2008:94), the word "challenge" refers to something that hinders the improvement or accomplishment of something. This section provides potential challenges in the four constructs of GSCM as identified in the conceptual framework and research objectives of green procurement, green manufacturing, green transportation and product recovery. In the context of this research study, challenges include influences such as the lack of financial resources or customer interest and high investments costs, which hold back the process of implementing green supply chain initiatives in the FMCG industry. A clear understanding of these challenges is important as it will enable companies to effectively manage and prioritise their resources. Numerous GSCM challenges as identified from the literature reviewed are reflected in table 3.2 and subsequently discussed below.

Table 3.2: Framework of potential green supply chain challenges

Green supply chain construct	Greening Challenges	Internal/external
Green procurement	Lack of knowledge and information sharing between upstream and downstream partners	Internal
	Supplier reluctance to change towards GSCM	External
	Information gap among managers	Internal
	Lack of social concerns	External
	Poor legislation on green procurement	External
Green manufacturing	Lack of IT implementation	Internal
	Organisation's reluctance to adopt technology advancement	Internal
	Market competition and uncertainty	External
	Lack of implementing green practices	Internal
	Lack of top management commitment	Internal
	High initial investment and costs	Internal
	Lack of customers awareness and demand	External
Green transportation	Poor quality of human resources	Internal
	Lack of government support systems	External
Product recovery	Costs related to product recovery	Internal
	Customers' negative perceptions about remanufactured products	External
	Lack of organisational encouragement	Internal
	Lack of markets for recovered products	External

3.3.1 Green procurement challenges

McKenzie (2004:17) maintains that green procurement functions include outsourcing, vendor auditing, management and selection, supplier collaboration and supplier

development, and each of these activities can be expanded to have greening components. Upstream dimensions of the supply chain, as with activities throughout the supply chain, could have both internal and external challenges that hinder greening practices in procurement activities. Hence this section provides potential green procurement challenges in the FMCG industry while indicating whether these challenges are of internal or external origin.

3.3.1.1 Lack of knowledge and information sharing between upstream and downstream partners

Lack of information sharing between suppliers and customers could be a challenge in the implementation of green procurement. Some limitations may exist during information sharing, but there could also be challenges with regard to information availability, for example, in a case where information is not easily available (Beamon 2008:47). It is important for organisations to be aware of the environmental implications for their suppliers and their supplier's processes and operations. For competitive reasons, some suppliers may not be willing to disclose information to their buyers (Zhu, Sarkis & Lai 2008:85). Sometimes suppliers find information valuable, providing them with a competitive edge, and therefore may not want to share it. Lack of knowledge and information sharing between upstream and downstream partners could be a major internally focused challenge in the adoption of green procurement the South African FMCG industry.

3.3.1.2 Supplier reluctance to change towards GSCM

Strong interactions with suppliers lead to lower inventory levels and lower costs and facilitate improved profitability. Sarkar and Mohapatra (2009:35) argue that participation of suppliers in the design process and technology impacts on the total performance efficiency of the whole supply chain. The reluctance of suppliers to change towards green procurement results from the traditional attitude and interests of the suppliers being dissimilar from those of the entire network (Sage 2010:137). Relationships between suppliers and manufacturers are significant for the development of GSCM initiatives. The collaboration between manufacturers and customers is essential to facilitate manufacturing of environmentally friendly products. Suppliers must fulfil the sustainability requirements of the companies to sustain supplier

relationships (Sarkar & Mohapatra 2009:35). Therefore, it can be concluded that supplier reluctance to change towards GSCM is a potential externally focused challenge to effectively implement green procurement in the FMCG industry.

3.3.1.3 Information gap among managers

The information gap among managers regarding environmental sustainability is a potential challenge in the adoption of green procurement (Kumar & Chandrakar 2012:52). Tsai and Ghoshal (2008:33) maintain that one of the major challenges in the implementation of greening initiatives is the lack of sufficient information among some managers with regard to financial paybacks of GSCM initiatives. The information gap could be an internally focused green procurement challenge in the FMCG companies in South Africa.

3.3.1.4 Lack of social concerns

According to Digalwar and Metri (2010:114), numerous pressures from interest groups, that is, NGOs, compel companies to incorporate environmental sustainability activities in their functions. Therefore, if there is no scrutiny from interest groups, companies will not be forced to act quickly on matters related to environmental sustainability in procurement (Digalwar & Metri 2010:115). Hence, a lack of social concern could be an external green procurement challenge in the South African FMCG industry.

3.3.1.5 Poor legislation on green procurement

Environmental policies and regulations keep on changing with the change of regulatory climates (Digalwar & Metri 2010:91). Accordingly, companies' change procurement processes need to respond to or comply with the requirements of environmental management system, instead of proactively establishing an environmental management system (Ravi & Shankar 2012:37). Thus poor legislation could be an important externally focused green procurement challenge in the South African FMCG industry.

3.3.2 Green manufacturing challenges

According to Ninlawan *et al.* (2010:64), "green manufacturing enhances the product value, which offsets the cost of environmental investments and improves the corporate

image of a company and green product innovation pertains to the evaluation of a product's economical, technical and commercial feasibility." However, current challenges in green manufacturing hinder the implementation of environmental sustainability practices in procurement. This section, therefore, focuses on potential green procurement challenges in the South African FMCG industry. Five of the challenges are internally driven and the other two externally driven.

3.3.2.1 Lack of information technology implementation

According to Hui Ho, Shalishali, Tseng and Ang (2009:83), IT systems have the ability to support cooperative supply chain processes and enhance the performance of the supply chain. Therefore, it is essential to have an efficient information and technology system in place, in order to support GSCM throughout various phases of the product life cycle (Hui Ho *et al.* 2009:83). Well-organised information systems are necessary to ensure the effective tracking and tracing of product returns and to link with previous sales (Ravi & Shankar 2012:77). The development of relationships to attain effective green manufacturing in the FMCG companies in South Africa requires IT support. It is important to facilitate efficient handling of forward and backward information flows of materials to enable efficient management of green supply chain (AlKhidir & Zailani 2009:85).

Enablement of IT will increase automated operations, thus decreasing paperwork. IT can provide faster and more effective ways of communication among supply chain stakeholders in order to accomplish capable SCM. Information technology minimises the usage of paper which supports the philosophy of GSCM. Sarkar and Mohapatra (2009:45) in their study found that energy efficient solutions can be provided by technology and this has a favourable effect on the environment. Sarkar and Mohapatra (2009:59) also maintain that IT facilitates the achievement of a greener supply chain by ensuring the optimisation of functions. Hence, a lack of IT execution could be an internally focused challenge when accomplishing effective green manufacturing.

3.3.2.2 Organisation's reluctance to adopt technology advancement

Kannan, Noorul Haq, Sasikumar and Arrununchchalam (2008:72) argue that an organisation that has more experience of adopting and implementing relevant technologies is likely to have a greater technology innovation. Companies are likely to have a greater ability to execute innovation when the efficient sharing of knowledge is facilitated within the organisation (Kannan *et al.* 2008:96). Advancement in technology can be accomplished by ensuring effective sharing of technological information that is clear (Cooper 2011:36). Organisational obstruction leads to difficultly in the execution of essential organisational transformation. This is particularly true when there are changes in the main organisational features, such as the objectives of the organisation, types of authority, fundamental technology, market strategy and operational approach (AlKhidir & Zailani 2009:25). So, reluctance to change technology development or advancement could be an internally focused green manufacturing challenge in the South African FMCG industry.

3.3.2.3 Market competition and uncertainty

Yu Lin (2009:193) argues that high fluctuations in the market increase global competitiveness. A company's innovative ability as well as any attempts to adopt innovations will be influenced by the external environment in which it operates its business (Hosseini 2007:23). It can, therefore, be concluded that market competition and uncertainty is an externally focused challenge in achieving effective green manufacturing in the South African FMCG industry.

3.3.2.4 Lack of implementing green practices

Yu Lin and Hui Ho (2010:192) maintain that innovative practices to ensure a green supply chain are connected with the explicitness of the green practices in order to accumulate understanding and knowledge and for organisational reinforcement. Designing for the environment is achieved by considering non-harmful, reusable and recyclable resources in the design phase (Ravi & Shankar 2012:249). The safer discarding of products after their effective end of life can be accomplished through end of life product management. Inventive and creative green practices consist of disposal of hazardous solid waste, energy conservation, recycling and reusing materials.

The end life management of a product is an important issue. Usage and advancement of innovative and creative environment-friendly products and procedures stimulate and improve environmental performance. Innovative green practices also include disposal of dangerous solid waste, conservation of energy and recycling and reusing of materials (Morelli 2011:31). Innovative green activities encourage innovative design, opportunities for new markets and the manufacture of products of improved quality. However, as a result of competition in the market and cost implications, the cost saving and adoption of green manufacturing practices by the company initially requires financial investment (Ravi & Shankar 2012:21). Therefore, it can be deduced that a lack of implementation of green practices is a potential internally focused challenge to effectively implement green manufacturing in the FMCG industry.

3.3.2.5 Lack of top management commitment

Zhu and Sarkis (2011:121) claim that commitment from top management is essential for the execution of any strategic programme. Support from top management is particularly valuable for the accomplishment of green manufacturing. The role of top management is to encourage and effect the establishment of the application of environmental sustainability (Sarkis 2009:39). It encourages the adoption of the existing advancements in technology applicable to green practices. Top management is the source of greening strategies and greening initiatives since they facilitate and encourage implementation of these initiatives. For that reason, a lack of commitment from the top management is a potential internally focused challenge to implementing green manufacturing in the South African FMCG industry.

3.3.2.6 High initial investment and costs

Traditionally, cost has been utilised as the primary measure of performance. Typically, high cost is a challenge in implementing green manufacturing as opposed to conventional manufacturing. There is a high financial investment prior to implementation of greening initiatives. There are two types of costs, namely, direct cost and transaction costs. According to AlKhidir and Zailani (2009:47), both types of costs are expected to create a major challenge in the implementation phase of GSCM. Enablement or facilitation of IT, adoption of technology advancement, recruiting quality workforce, conducting raining programs will necessitate a high preliminary investment

(AlKhidir & Zailani 2009:47). High initial investment and cost could be an internally focused green manufacturing challenge in the South African FMCG industry.

3.3.2.7 Lack of customers awareness and demand

The major challenge to effective green manufacturing is that customers are not aware of the benefits that can be derived from using environmentally friendly products (Sage 2010:192). Customers' demands are a critical type of external pressure when implementing GSCM. Therefore, government should establish awareness campaigns to provide customers with sufficient information regarding environmentally friendly products and what benefits they derive from them. Companies could create awareness among customers by generating advertising initiatives on different platforms. Customer knowledge on environmentally friendly products could encourage them to buy these products, thus improving reputation of the company and sales volumes (AlKhidir & Zailani 2009:129). As a result, it can be concluded that one of the externally focused challenges to effective green manufacturing in the South African FMCG industry could be a lack of customer awareness and demand.

3.3.3 Green transportation challenges

Transportation is considered green when it "supports environmental sustainability, such as protection of the global climate, ecosystems, public health and natural resources" (Ghobakhloo *et al.* 2013:38). It has to support economic and social environment since these are the other two pillars of sustainability. The goal of green transportation is to support economic growth (Evans & Denney 2009:84). However, challenges in green transportation could make it impossible to achieve these goals. Hence this section discusses potential green transportation challenges in the South African FMCG industry. As shown in Table 3.2 one challenge is internal and the other external.

3.3.3.1 Poor quality of human resources

An organisation that offers better training or education to their workforce will be better placed to effectively implement green transportation. A company can also accomplish innovative ideas through quality human resources acquiring skills to operate new technologies easily and ensure sharing of knowledge among them (Yu Lin & Hui Ho

2009:39). Therefore, it is important to attract and employ the right staff, in other words, those who have a greater awareness of green transportation practices. Initially, top management may experience an increase in costs, but in the end it might promote the effective implementation of green practices (Yu Lin & Hui Ho 2009:39). Conducting training programmes on a regular basis may create greater knowledge of green transportation and encourage such implementation within the organisation. Therefore, the presence of poor quality of human resources is an internally focused challenge that could negatively impact on the implementation of green transportation in the South African FMCG companies.

3.3.3.2 Lack of government support systems

According to Scupola (2009:154), regulations from government can facilitate or hinder the innovation implementation. Smaller business may be discouraged when the government establishes regulations on natural environment protection, fees or levies, which may also be time consuming. The misrepresentation of incentives by tax structures may also discourage the implementation of green transportation (BearingPoint 2008:74; Lee & O'Marah 2011:138). AlKhidir and Zailani (2009:34) maintain that lack of support from government institutions is perceived as a challenge to green transportation adoption. Support systems from government may facilitate innovative green transportation and enhanced commitment from top management; it may also improve IT adoption, quality of manpower and IT enablement.

Support systems from government facilitate the utilisation of and promotion of transportation that is environmentally friendly; they also improve the use of eco-friendly packing and labelling of products, effective waste management, the use of recyclability evaluation methods and appropriate workplace management. Monitoring and control of companies' environmental performance through the implementation of environment management system and thus, organisations' environmental performance management, is important. Therefore, a lack of support systems from the government is a potential externally focused green transportation and delivery challenge in the South African FMCG industry.

3.3.4 Challenges in product recovery

Product recovery is defined as "the task of recovering discarded products; it may include packaging and shipping materials and backhauling them to a central collection point for either recycling or remanufacturing" (AlKhidir & Zailani 2009:82). Potential challenges in product recovery include the cost related to product recovery, lack of organisational encouragement and lack of market for recycled products as described in the discussion below. Of the four challenges, two are internal and the other two external.

3.3.4.1 Costs related to product recovery

The biggest pressure the organisation faces is to reduce costs (Pollock 2010:8). There are many cost implications related to product recovery, such as investment in activities and equipment to generate energy, minimise waste and recover obsolete products. Therefore, costs related to product recovery could be an internally focused challenge to implement product recovery in the South African FMCG industry.

3.3.4.2 Customers' negative perceptions about remanufactured products

Customers have a negative perception about products that undergo remanufacturing and recycling (Dampier, 2006:22). It becomes a challenge when customers do not regard recycled products as meeting their specified needs. This has a negative impact on the sales of the company. Thus, companies are likely to be reluctant to adopt product recovery initiatives due to lack of customer demand for these products (Riedel, 2004:1; Dampier, 2006:22). Therefore, customers' negative perceptions about remanufactured products could be an externally focused challenge to implement product recovery in the South African FMCG industry.

3.3.4.3 Lack of organisational encouragement

Yu Lin and Hui Ho (2009:47) maintain that informal relations and enhanced communications enable companies to implement product recovery. According to Ravi and Shankar (2012:67), training and education are key requirements for accomplishing effective adoption and application of GSCM practices in any. Top management may support and encourage the workforce to learn about green practices. Companies may also reward employees who are willing to and engage themselves in green activities,

such as facilitating recovery of energy and water. Personnel may receive assistance when they face difficulties in the accomplishment of green initiatives and may be provided with support to educate themselves about green practices (Tsai & Ghoshal 2008:114). Therefore, it is important to eliminate lack of organisational encouragement since it an internally focused challenge to product recovery in the South African FMCG industry.

3.3.4.4 Lack of markets for recovered products

The manufacturers of recovered products may find it difficult to find suppliers as well as customers for their products. Suppliers of recyclable waste can be found in different households and industries (Evans & Denney 2009:16). It is difficult to predict the amount of waste material available because the amount of waste product or scrap material depends on the number of products that were produced initially. Therefore, the recycling companies may incur high cost of locating suppliers of scrap materials (Kumar & Chandrakar 2012:98). Lack of market for recyclable products could be an external challenge to implement product recovery.

A summary of potential green supply chain challenges is presented in Table 3.2. The challenges are categorised into five potential green procurement challenges, seven green manufacturing challenges, two green transportation challenges and four challenges associated with product recovery.

3.4 SUMMARY

The literature review identified 13 categories of best practice in green supply chain that can be adopted by the FMCG companies to ensure effective and efficient functioning of environmental sustainability initiatives. Furthermore, the literature review identified five potential green procurement challenges, seven green manufacturing challenges, two green transportation challenges and four challenges associated with product recovery; all these challenges hinder the effective adoption of GSCM practices. These GSCM best practices and challenges were used to draw up the interview guide and to conduct interviews.

The next chapter (Chapter 4) presents the research design and methodology. The chapter includes the following: the research design, the research approaches/paradigms, the study site, the target population, the sampling method, the sample size, the data collection methods, data quality control, data analysis, ethical considerations and the limitations of the study.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The previous chapters have dealt with introduction and background to the study, supply chain, SCM and GSCM and GSCM best practices and challenges. The purpose of this chapter is to outline the research methodology used to conduct empirical study. The researcher formulated an appropriate research strategy for the stated research question. An overview of different methods for conducting a research is provided, together with the rationale for why a particular research strategy was selected.

This chapter starts by explaining the meaning of research process. Subsequently, the nature of the research question, the objectives of the research study and the proposed methodology are described, pointing the research strategy in the direction of qualitative research.

4.2 THE RESEARCH PROCESS

Saunders, Lewis, and Thornhill (2007:8) argue that research is a "multistage process that must be followed in order to undertake and complete a research project". The research process is described as "a series of stages through which a researcher must pass" (Saunders *et al.* 2007:1). These stages in the research consist of formulation and clarification of a topic, literature review, research design, data collection, data analysis and writing up the research project.

The objectives of this study are aimed at identifying the GSCM challenges that Unilever faces and to determine opportunities that Unilever derives from GSCM and the remedies they have in place to overcome these challenges.

4.2.1 Research objectives:

1. to determine the GSCM challenges that Unilever faces
2. to determine the remedies Unilever has in place to overcome these challenges
3. to determine what the benefits are that Unilever derives from GSCM

4.2.2 Research questions

The following are the research questions that the study aims to address:

1. What are the GSCM challenges that Unilever faces?
2. What remedies does Unilever have in place to overcome these challenges?
3. What are the benefits that Unilever derives from GSCM?

In order to achieve these objectives and research questions, a research roadmap was designed. Figure 4.1 below is an illustration of a research roadmap that can be adapted for any research study. The steps included in this figure are relevant for this study.

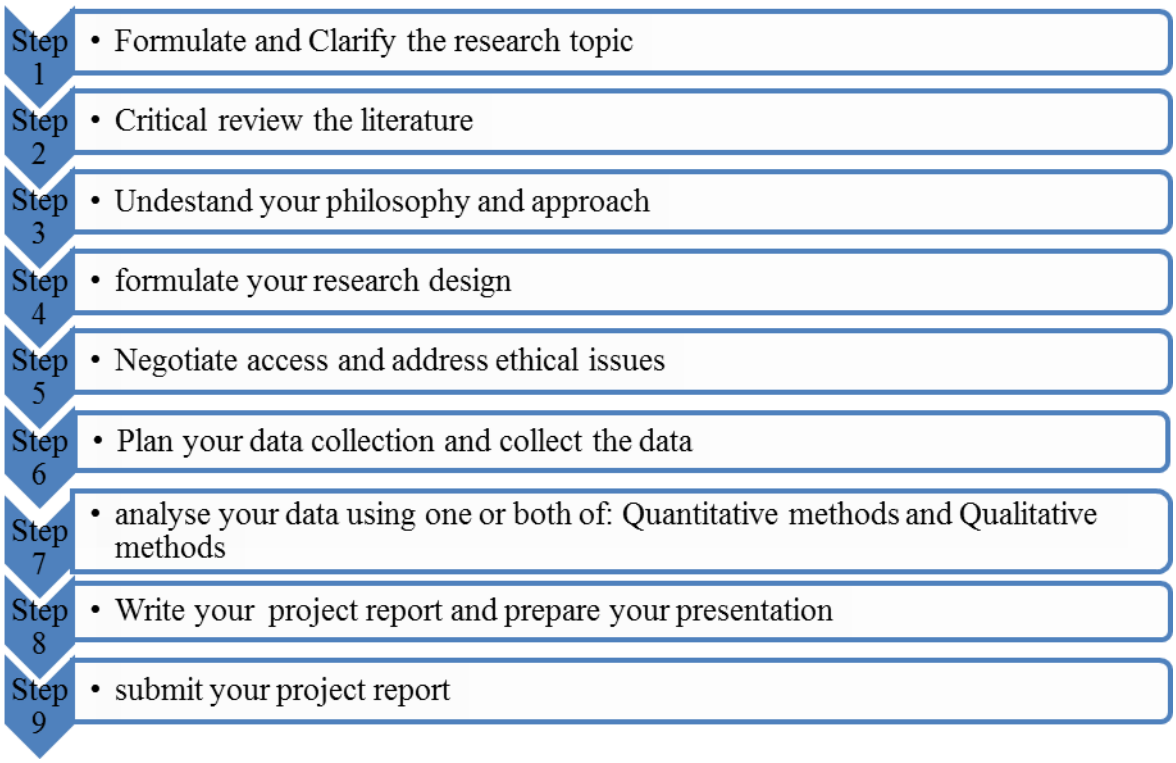

Figure 4.1: A research roadmap

(Source: Saunders *et al.* 2007:10)

Figure 4.1 provides an illustration of a research roadmap that consists of nine steps which are essential for the completion of a research project. The purpose of **step 1** is to assist the researcher to generalise the ideas, in order to select a suitable topic for his or her research study. It may be very difficult to design a proper plan for conducting a

research without clarity on how to conduct the research. Therefore, the formulation and clarification of the research topic is the first step of a good research project. Once the topic is formulated, it is critical to select the research strategy, data collection method and data analysis technique that is appropriate for the chosen topic. Aspects considered in choosing the topic of this study included the availability of literature and sample population for the collection of data. The topic for this study is GSCM challenges in the FMCG industry: a case of Unilever. Prior to finalising the topic, the researcher was granted permission to conduct his study at Unilever by senior management.

Step 2 includes outlining what is important to ensure an in-depth review of the relevant literature and selection of a range of primary, secondary and tertiary literature sources available. At this stage, it is important to properly record data and to evaluate it relevance. The literature review in chapters 1, 2 and 3 provide insight into the South African FMCG industry, an overview of the scope and concept of SCM, an overview of the scope and concept of GSCM and an overview of GSCM best practices and challenges. The literature review formed the basis to draw up the interview guide.

Step 3 deals with the understanding of research philosophy and approach. It is essential that a researcher think about his or her own values and view of the world and the impact this might have on the way the research is undertaken (Saunders *et al.* 2007:10). Saunders *et al.* (2007:10) maintain that "the research philosophy contains important assumptions about the way in which the researcher views the world and these assumptions underpin the research strategy and the methods chosen as part of that strategy". In the current study, the practical considerations informed the adopted philosophy.

Step 4 deals with the formulation of the research design. At this step, it is important to ensure the credibility of the findings of the study by choosing an appropriate research design. A research design is important because it is the roadmap that will guide the research study.

Step 5 deals with negotiating access and addressing ethical issues. It is essential to identify ethical issues that are likely to be experienced during each phase of the research process. Ethical consideration was an important part of the entire research process of

this study. In addition, prior to any empirical research taking place, ethical clearance was granted by the University of KwaZulu-Natal.

Step 6 deals with planning for the collection of the data using one or more of the following methods: sampling, secondary data, observation, semi-structured and in-depth interviews and questionnaires. Also, it is important that a researcher provides a reason why a chosen data collection method is necessary for the study and how it will contribute in achieving research objectives.

Conducting data analysis using one or both of quantitative and qualitative methods is included in **step 7**. Should the researcher prefer to use quantitative methods, it is important to understand different types of data and how to create a data matrix, to code data, to explore relationships and to examine trends. Also, when using the qualitative method, a researcher needs to know how to conduct a manual analysis and use computer aided qualitative data analysis software. A researcher also needs to understand the challenges associated with transcribing data and the use of deductively based and inductively based analytical procedures.

Step 8 deals with the writing of the project report and preparing for presentation. This stage focuses on the format of writing a research project, the style and the content of the final project. The writing of the research project is as an essential part of the research process.

Once the project is completed, the final stage, **step 9,** is to submit the project.

4.3 RESEARCH DESIGN

A research design is a plan or blueprint for conducting a research. It describes the research philosophy, research paradigm and research approach used as a basis for obtaining the data needed to achieve research objectives and solve research questions (Creswell & Plano Clark 2007:68).

4.3.1 Classification of research design

As explained in Section 1.9, this study is exploratory and descriptive and a case study approach was adopted. Table 4.1 differentiates between these two designs.

Table 4.1: Differences between exploratory and descriptive researches

	Exploratory	**Descriptive**
Objective	Exploratory research aims to improve understanding of a researcher's about a topic and to seek new insights (Robson 2011:37). It also intends to provide understanding and familiarity with a specific situation (Corbin & Strauss 2008:37).	Bernard and Ryan (2010:53) maintain that the objective of descriptive research is to explore, explain and provide additional information about a topic. With a descriptive study, a researcher seek to facilitate description of a particular situation and fill the existing gaps.
Characteristics	An exploratory study is characterised by its ability to offer qualitative data and provide a better insight into a concept or put more emphasis on a problem as opposed to offering precise measurement or quantification (Welman *et al.* 2006:68).	A descriptive study is used to describe a situation or population. According to Bickman *et al.* (1998:24), descriptive research studies can provides answers to questions such as "what is?" or "what was?" Investigations can characteristically answer "why?" or "how?"
Methods	Exploratory research study can be conducted using three methods. These include literature review, undertaking interviews with experts in the subject and focus group interviews.	The following three main methods can be used to conduct descriptive research study: observational methods, case-study methods and survey methods.

Adapted from Bickman and Rog (1998:24); Welman *et al.* (2006:68); Bernard & Ryan (2010:93)

As indicated in Table 4.1, the research design is exploratory and descriptive because it provides additional information about the topic of green supply chain. The study aims to provide insight into the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation.

Descriptive research is also carried out in this study to describe and determine characteristics of the variables that the researcher is interested in (Sekaran 2003:105). The purpose of this research study is, firstly to explore and describe the GSCM challenges that Unilever faces, secondly, to determine the remedies they have in place to overcome these challenges and, finally, to determine what the benefits are that Unilever derives from GSCM.

Robson (2011:37) defines an exploratory study as "a valuable method for finding out what is happening, for seeking new insights, for asking questions and for assessing phenomena in a new light; it is particularly useful if the researcher wishes to clarify his or her understanding of a problem where the researcher is unsure of the precise nature of the problem". It refers to research that mainly intends to gain insight and becoming familiar with a specific situation (Bernard & Ryan 2010:93).

A case study approach is adapted in order to: (1) identify GSCM challenges Unilever faces; and (2) to determine the strategies it has in place to overcome these challenges. By its nature, case-study research is descriptive and exploratory and can provide a rich body of information about particular situations (Terreblanche, Durrheim & Painter 2007:461; Bickman & Rog 2009:167; Bernard & Ryan 2010:93). This approach is appropriate in order to provide a deeper understanding into and identifying GSCM challenges that Unilever faces.

However, Malhotra (2007:82) remarks that causal links in case-study research are difficult to test and generalisations cannot be made from a single case study. Denzin (2010:178) defines a case study as "a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context, using multiple sources of evidence". Incorporating this research approach is useful so as to provide answers into how or why questions about a contemporary set of events over which the investigator has little or no control.

4.3.2 Research paradigm

A paradigm can be defined as a way of examining phenomena so as to gain particular understandings of them and attempt explanations (Welman *et al.* 2006:57). There are two main research paradigms, namely, positivism and post-positivism. According to Welman *et al.* (2006:58), positivism stands for objectivity; it insists on the measurability and predictability and constructs laws and rules for researching phenomena. Post-positivism on the other hand stands for subjectivity and understanding (Welman *et al.* 2006:58). Positivism focuses on quantitative methods, such as survey questionnaires and experiments, in researching phenomena, whereas anti-positivism focuses on a range of qualitative research methods, such as face-to-face interviews and observations (Bernard & Ryan 2010:76).

The research paradigm for this study is post-positivism, as it is a qualitative study. It is characterised by its purpose, which is linked to providing insight into public life, and its procedures, which generate words instead of numbers as data for analysis. Qualitative research involves the use of approaches such as observing the participants or case studies which result in a narrative and expressive account of a practice (Denzin 2010:34).

This qualitative study adopted a case study approach because it provides insight into the GSCM challenges that Unilever faces, how they overcome these challenges and also provides insight into the benefits that Unilever derives from GSCM.

4.4 RESEARCH METHODS

Research methods are specific techniques that researchers use to sample, collect, measure and analyse data (Charmaz 2008:74). The semi-structured in-depth interviews were undertaken to collect primary data in order to address the research objectives of this study.

4.4.1 Data collection

Data collection is "the process of gathering and measuring information on variables of interest in an established systematic fashion that enables one to answer stated research

questions, test hypotheses, and evaluate outcomes (Sekaran 2003:64)". The methodological triangulation will be used in the study since it uses more than one method of data collection. Data collection includes a literature review, semi-structured in-depth interviews and non-participant structured observations.

'Triangulation' is "a process of verification that increases validity by incorporating several viewpoints and methods" (Olsen 2004:35). Kumar (2002:7) argues that 'triangulation' "is actually used to increase the study accuracy. In this case 'triangulation' is one of the validity measures". "Triangulated techniques are helpful for cross-checking and used to provide confirmation and completeness, which brings 'balance' between two or more different types of research" (Olsen 2004:46). The purpose is to increase the credibility and validity of the results. Often the aim is to obtain confirmation of the findings through convergence of different perspectives. Triangulation "allows researchers to be more confident of their results and can play many other constructive roles as well" (Ahmed 2007:38). It can stimulate the creation of inventive methods, new ways of capturing a problem to balance with conventional data collection methods, which may help to uncover the deviant dimension of a phenomenon (Creswell 2003:92).

Table 4.2 is an illustration of how the data collection techniques used were useful in collecting primary data to help achieve the research objectives.

Table 4.2: Matching objectives and data collection techniques for primary data

RESEARCH OBJECTIVE	**TECHNIQUE ADDRESSING THE OBJECTIVE**
To determine the GSCM challenges that Unilever faces	This objective will be achieved through a qualitative investigation which consists of in-depth semi-structured interviews
To determine the remedies Unilever has in place to overcome these challenges	This objective will be achieved through a qualitative investigation which consists of in-depth semi-structured interviews and non-participant, structured observation.

To determine what the benefits are that Unilever derives from GSCM	This objective will be achieved through a qualitative investigation which consists of in-depth semi-structured interviews.

Saunders *et al.* (2007:611) define secondary "data as data used for a research project that were originally collected for some other purpose". This includes written materials such as books, journals, magazine articles, minutes of meetings, correspondence, transcripts of speeches, public records and newspapers.

Secondary data were gathered and used in this study to provide a perspective on the FMCG industry, internationally and in South Africa, an overview of the scope and concept of SCM, an overview of the scope and concept of GSCM, and insight into important best practices in GSCM and GSCM challenges. The data obtained from different secondary sources was acknowledged by full referencing.

The empirical research conducted in this study involved conducting semi structured in-depth interviews using an interview guide at Unilever. The empirical study also included observation at the Unilever factory for duration of 28 days using an observation checklist. The participants included eight managers at Unilever, Riverhorse Valley, Newland East, Durban.

4.4.2 Target population

A target population is "the entire aggregation of respondents that meet the designated set of criteria" (Sekaran 2003:57). The Consumer Goods Council of South Africa (CGCSA) is the representative body of the entire FMCG industry. This body was established in 2002 and has 12 000 member companies across the consumer goods value chain, including retail, wholesale and manufacturing sectors (CGCSA, n.d.). For the purpose of this study and to answer the research questions, one of the 12 000 FMCG companies was approached to participate in this study. The study was therefore narrowed down to include only one FMCG company operating in South Africa, namely Unilever.

This study was based at the Unilever-Indonsa factory. The main reason for choosing Unilever as a sample is that it is one of the major FMCG companies in the South Africa. Its head office is located in Durban (La Lucia), South Africa.

Unilever manufactures and sells various product categories worldwide. These products consist of more than four hundred brand names and are used by two billion people. Among their product range are the four categories of savoury food brands produced at the Unilever's Indonsa plant in Durban (Unilever 2012:02). These brands include Knorr, Robertsons, Knorrox and Rajah. The company has played a major role in ensuring that environmental sustainability is facilitated in food production by formulating a sustainable living plan aimed at reducing the negative environmental impact caused by carbon dioxide emissions and irresponsible disposal of waste to the landfill. The company is also committed to reduce their packaging and to ensure sustainable sourcing (Jones & Miskell 2007:95).

A non-probability, purposive, judgement sampling approach to select the appropriate company to be investigated was deemed appropriate. A non-probability sampling method entails the selection of elements with the aim to replicate certain group activities within the population that is experimented. A purposive sampling design was utilised to ensure that accurate and reliable data was collected (Creswell & Plano Clark 2007:22). The judgement sampling method aims to identify and gain access to the individuals who have the requisite information about the topic studied. This design was deemed suitable for this study since it targeted one specific FMCG company and interviewed specific participants who had the required information on the topic investigated (Sekaram 2003:64).

4.4.3 Sampling method

This study was conducted using a non-probability, purposive sampling technique to select the appropriate company to be investigated. The aim of the study was to investigate GSCM challenges faced by Unilever and the remedies that Unilever has in place to overcome these challenges. A non-probability sampling method, which entails the selection of elements with the aim to replicate certain group activities within the population that is the subject, was used (Corbin & Strauss 2008:94). Therefore, the

researcher used this method to select one company that has features of the entire FMCG industry. The purposive sampling method calls for special efforts to locate and gain access to the individuals who have the requisite information (Charmaz 2008:87). In the study, specific participants were selected based on their specialisation in the topic under study. Therefore, they are regarded as having sufficient information that can be used to develop findings and conclusions. A purposive sampling technique can provide researchers with the justification to make the findings transferable from the sample (Oppenheim 2009:52).

4.4.4 Sample Size

According to Saunders *et al.* (2007:610), a sample is "a subgroup or part of a larger population". The sample size refers to "the number of people or units selected to participate in the research" (Saunders *et al.* 2007:612). In this study, the sample size included eight participants across different departments at Unilever. This sample size is believed to be adequate for this study based on sample sizes of similar studies conducted. Thus the researcher believes that a sample size of eight participants will yield adequate data for the study.

4.4.5 Study participants

Saunders *et al.* (2007:605) define a participant as "a person who answers questions, usually in an interview or group interview". The following individuals participated in the empirical research study (Table 4.3):

Table 4.3: List of participants included in this study

DEPARTMENT	PARTICIPANT	DATE	TIME
Planning	Participant A	04/09/2015	14:00
Procurement and Planning	Participant B	18/08/2015	14:00
Manufacturing	Participant C	20/08/2015	11:00
Quality	Participant D	27/08/2015	13:00
Warehousing	Participant E	02/09/2015	13:30
Transportation and Warehousing	Participant F	20/08/2015	12:00
Safety, Health and Environment	Participant G	18/08/2015	10:30
Manufacturing	Participant H	13/08/2015	14:00

A total number of eight managers at Unilever were interviewed in order to provide insight into the green supply chain challenges that Unilever faces, to determine the strategies they have in place to eliminate these challenges and to determine the benefits that Unilever derives from GSCM.

Interviewing employees in Planning, Procurement and Planning provided the data on the green procurement challenges that Unilever faces. Employees from Manufacturing and Quality departments provided information on the green manufacturing challenges that Unilever faces and the remedies Unilever has in place to overcome these challenges. Interviewing employees in Transportation and Warehousing departments contributed towards determining the green transportation challenges. Employees in Safety, Health and Environment department provided insight into the product recovery challenges that Unilever faces and how these can be overcome.

4.5 SEMI-STRUCTURED IN-DEPTH INTERVIEWS

Interviews are divided into structured, semi-structured in-depth interviews and unstructured interviews. On the one hand, interviews are prepared beforehand and they take a certain form or structure; they are not very flexible. Unstructured interviews, on the other hand, have little or no structure and the idea is that the researcher is able to direct the interview in whichever direction seems appropriate at that particular moment (Sekaran 2003:118). Semi-structured interviews are structured interviews but with some flexibility, allowing participants time and scope to explain themselves so that the researcher is able to focus the interview on areas relevant to individual participants. Semi-structured in-depth interviews foster an understanding between the researcher and the participant (Sekaran 2003:119). Hence, for the purpose of this study semi-structured in-depth interviews were deemed appropriate. As a result, the researcher was enabled to focus the interview toward knowledge held by different managers across the various departments.

- **Interview guide**

The design of the interview guide was based on the conceptual framework derived from the findings from the literature review in terms of the objectives of this study. The interview guide that was designed and used for the empirical field research is included as Appendix B.

The interview guide mainly consisted of open ended questions. An open-ended question means that the participant is free to answer it in his or her own words (Oppenheim 2009:57). This provides in-depth responses and allows the participants to freely express their views regarding GSCM challenges. The questions in the interview guide were designed in such a way as to ensure that answers and responses to the questions were clear and unambiguous.

The interview guide consisted of the following sections:

Section 1: Company profile

This section provided general information about the participating company, namely, Unilever's Riverhorse factory. It consisted of open-ended questions about the organisational structure of the company.

Section 2: General

The aim of this section was to ascertain from the participants what they perceive to be the green supply chain challenges that Unilever faces and what remedies Unilever has in place to overcome these challenges.

Section 3: Green procurement

The aim of this section was to provide insight into the green procurement challenges that Unilever faces, the benefits Unilever derives from green procurement practices and the strategies that Unilever has in place to overcome these challenges. Questions in this section were based on the best practices and the potential green supply chain challenges derived from the findings of the literature review

Section 4: Green manufacturing

This section aimed to provide an understanding of the green manufacturing challenges Unilever faces, the remedies Unilever has in place to overcome these challenges in green manufacturing and the benefits Unilever derives from adopting green manufacturing activities. Questions under this section were based on the best practices and potential green supply chain challenges derived from the findings of the literature review

Section 5: Green transportation

The purpose of this section was to provide insight into the green transportation challenges Unilever faces, the strategies Unilever has in place to overcome the identified green transportation challenges and the benefits Unilever derives from green transportation practices. Questions under this section were based on the best practices and potential green supply chain challenges derived from the findings of the literature review.

Section 6: Product recovery

The aim of this section was to provide insight and understanding into the challenges associated with product recovery, the strategies Unilever has in place to overcome the identified product recovery challenges and the benefits Unilever derives from implementing product recovery activities. Questions under this section were based on

the best practices and potential green supply chain challenges derived from the findings of the literature review.

4.6 OBSERVATION

Observation refers to looking at something without influencing it and simultaneously recording it for later analysis (Willig 2013:32). Sekaran and Bougie (2014:130) argue that "observation concerns the planned watching, recording, analysis, and interpretation of behaviour, actions, or events". Numerous approaches to observation may be distinguished by four key dimensions that characterise the way observation is conducted, namely, control, whether the observer is a member of the group that is observed or not, structure, and concealment of observation.

***Control*:** Observations may be conducted in a controlled (artificial) or in an uncontrolled (natural) setting. Controlled observation occurs when the situation or setting is manipulated by the researcher, in other words, when observational research is carried out under carefully arranged conditions (Willig 2013:32; Sekaran & Bougie 2014:131). Uncontrolled observation makes no attempt to control, manipulate or influence the situation (Sekaran & Bougie 2014:131).

Whether the observer is a member of the group that is observed or not: This can be participant or non-participant observation. In participant observation, the researcher gathers data by participating in the daily life of the organisation under study (Willig 2013:32; Sekaran & Bougie 2014:131). In the case of non-participant observations, the researcher is never directly involved in the actions of the actors but observes them from outside the actor's visual horizon, for instance, via a one-way camera (Sekaran & Bougie 2014:131).

***Structure*:** this deals with the extent to which observation is focused, predetermined, systematic, and quantitative in nature. In the structured observational study, the observer should have planned a predetermined set of categories of activities or phenomena to be studied (Willig 2013:33; Sekaran & Bougie 2014:132). Observations may be a part of the plan as in many other forms of exploratory and qualitative research. In such a case, the observer will record everything that is observed. Such a study will be an unstructured observational study (Sekaran & Bougie 2014:132).

***Concealment of observation*:** this occurs when the members of the social group under study are not told that they are being studied. In a concealed observation, subjects are not influenced by the awareness that they are being observed, whereas an unconcealed observation is more obstructive, perhaps upsetting the authenticity of the behaviour under study (Sekaran & Bougie 2014:133). Concealment of observation is not relevant in this study.

In this study, non-participant, structured observation was adopted in order to achieve the specific objectives of the study. In this observational study, the researcher had planned a predetermined set of activities to be studied aimed at answering the research questions of this study. The researcher kept focus during the various stages of the observation process in order to avoid being overwhelmed by large amounts of often disconnected data. This allowed the researcher to focus on the aim or purpose of the study. Thus, the observation checklist played an essential role in achieving this goal. The observations were conducted within 28 days of the empirical study.

- **Observation checklist**

An observation checklist is "a structure for observation that allows observers to record behaviours during the observation process quickly, accurately, and with minimal interviewer effect on behaviours" (Creswell & Plano Clark 2007:44). For the purpose of this research study, an observation checklist was drafted before commencing the observation, in order to observe situations or events in relation to the researcher's specific objectives. This observation checklist allowed for less time to be used during the observation process since the researcher only needed to check whether or not the situation exhibited the desired outcomes. It was imperative that all other green supply chain management (dependent variable) elements at the Unilever's Indonsa factory were held constant, while allowing their participation with regard to environmental sustainability to be the dependent variable. This provided an effective report on the identified gaps and successes. A copy of the observation checklist is attached as Appendix C.

4.7 DATA QUALITY CONTROL

Data quality control is concerned with the reliability, trustworthiness and credibility of the information that is gathered; it assesses the results obtained in terms of their similarities and checks if the results may be generally applicable to the entire population (Sekaran 2003:66). This section deals with the reliability and validity of the instruments that have been used to collect the data.

4.7.1 Reliability

Reliability refers to an evaluating measure which tests the accuracy and consistency of a measuring instrument in measuring whatever concept it is designed to measure (Sekaran 2003:56). According to Saunders *et al.* (2007:149), reliability refers to the extent to which data collection techniques or analysis procedures will yield consistent findings. It can be assessed by posing the following three questions:

1. Will the measures yield the same results on other occasions?
2. Will similar observations be reached by other observers?
3. Is there transparency in how sense was made from the raw data?

In order to ensure reliability, the interviews were recoded using a digital voice recorder. Data was then transcribed verbatim in order to make sure that all the important information was captured. The recorded information was played back to the participants by the researcher to make sure that the data was captured accurately and that it reflected what the participants said.

4.7.2 Validity

Validity refers to "the criteria for evaluating the effectiveness of measures which test how well an instrument measures the particular concept it is supposed to measure" (Sekaran 2003). Validity ensures that the research study does not deviate from what is considered to be the reality for the entire population of a study (Welman *et al.* 2011:142). According to Cavana, Delahaye and Sekaran (2000:212), different types of

validity tests can be used to test the goodness of measures. Validity tests can be categorised under four broad headings:

(1) *Face validity.* This is a basic and nominal index of validity. It shows that the items included in the questionnaire are clear and understandable to the respondents.

(2) *Content validity.* This ensures that the measures include a sufficient and representative set of items that draw on the concept.

(3) *Criterion-related validity.* This is determined when the measure separates people in terms of a criterion the measure is expected to predict.

(4) *Construct validity.* This confirms how well the results derived from the use of the measure fit the theories around which the test is devised (Welman *et al.* 2011:142).

The interview guide was based on the conceptual framework used in the study. It was pre-tested by the three academics in the School of Management, Information Technology and Governance, to ensure that the questions in the interview guide were clear and not ambiguous. Consistency and accuracy were also maintained during the interviews. This has contributed to the trustworthiness of the results of the study. The questions were phrased in simple language to capture all aspects of the factors to be measured. The participants were given the opportunity to ask questions and seek clarity before responding to questions.

- **Face validity**

In this research, face validity was used to ensure that open ended questions in the interview guide were not in contradiction with research questions. Face validity is defined as the extent to which a test is subjectively judged as measuring the concept it purports to measure (Foddy 2010:82). The researcher observes the items and makes a decision regarding whether the test is a valid measure of the concept being measured. This approach helps a researcher to find and eliminate potential flaws during a study (Denzin 2010:102). In the current study, face validity ensured that the answers to the open ended questions in the interview guide provided answers to the research questions. This ensures that the measures include a sufficient and representative set of items that draw on the concept.

Construct validity and content validity is integrated in order to confirm how well the results derived from the use of the measure fit the theories around which the test is devised. They are also integrated to ensure that the measures include a sufficient and representative set of items that draw on the concept.

4.8 DATA ANALYSIS

Data analysis can be defined as the process that is utilised by the researcher to minimise or to reduce the large amount of collected data so as to make sense of them (Sekaran 2003:94). During this process, data are organised, reduced through classification or summarisation, and patterns and themes in the data are identified and linked.

- **Thematic analysis**

In this study, the data collected was analysed using thematic analysis. Thematic analysis is "an approach to dealing with data that involves the creation and application of 'codes' to the data" (Creswell & Plano Clark 2007:88). 'Coding' refers to "the creation of categories in relation to the data, in other words, the grouping together of different instances of datum under an umbrella term that can enable them to be regarded as 'of the same type" (Creswell & Plano Clark 2007:88).

For the purpose of this study, data were recorded by making handwritten notes and by audio-recording the interviews to be transcribed later. Thematic data analysis took the form of the following stages: the coding of the findings of primary studies; the organisation of these 'codes' into related areas to construct 'descriptive' themes; and, the development of 'analytical' themes. The process of translation, through the development of descriptive and analytical themes, was carried out in a rigorous way that facilitated transparency of reporting. The process involved the identification of themes through careful reading and re-reading of the data. This is a form of pattern recognition within the data, where emerging themes become the categories for analysis. These data were collected from the in-depth semi-structured interviews conducted with the participants at Unilever.

4.9 ETHICAL CONSIDERATIONS

Ethics basically refers to the rules or standards for governing the relationship between people in such a way as to benefit all concerned, with shared respect for the needs and wants of all the individuals involved (Hitt 2008:42). The ethics committee at the University of KwaZulu-Natal issued ethical clearance for this study before any form of primary research was undertaken (see Appendix A). Before the interviews commenced, participants were provided with an informed consent form to complete and sign, noting that they were participating of their own free will and that they were free to withdraw from the study at any stage should they wish to do so. Any confidential information obtained from the research will be kept confidential and the participants were assured of anonymity (Hitt 2008:42). Therefore, observing ethical protocol, efforts were made not to disclose the identity of participants when quotes were used in this dissertation. This helped in guiding the researcher to conduct himself in an appropriate manner. Any secondary information was referenced accordingly.

4.10 LIMITATIONS OF THE STUDY

The limitations of this study are outlined as follows:

(i) Only one company in the FMCG industry (Unilever) is included in this study. Other FMCG companies operating South Africa did not take part in this study; therefore, the findings of this research cannot be generalised to all companies in the FMCG sector in South Africa.

(ii) GSCM challenges were identified through the literature review and semi-structured in-depth interviews with participants at Unilever in the supply chain department. It is suggested that not all challenges in the green supply chain may have been identified.

4.11 SUMMARY

This chapter described the research design and research methods used to conduct the empirical field research for this study. This study is exploratory and descriptive, using a case study approach to gain deeper insight and better understanding into the GSCM

challenges that Unilever faces, the benefits or opportunities that Unilever derives from green supply chain practices, and the remedies that Unilever has in place to overcome these challenges. The empirical field research focused on the collection, capturing, validation and analysis of the empirical data collected from Unilever's Indonsa factory. Empirical data were collected using semi-structured in-depth interviews with six participants representing Unilever and non-participant, structured observations were conducted to determine whether the Indonsa factory conforms to GSCM practices. An observation checklist was used during the observation process to ensure that the researcher focused on elements that are in line with the objectives of the study. The design of the interview guide was based on the conceptual framework derived from the findings of the literature review. The interview guide contained open-ended questions in terms of the objectives of this study.

The reliability and validity of the empirical data collected were addressed by conducting a pre-test to ensure that questions in the interview guide are clear and not ambiguous. The questions were phrased in simple language to capture all aspects of the factors to be measured. Ethical guidelines recommended for the type of research conducted were strictly adhered to during the research. Potential limitations associated with the research methodology followed were identified and addressed.

The results obtained are presented for discussion and the drawing of conclusions in accordance with the objectives of this study in the next chapter, Chapter 5.

CHAPTER 5

ANALYSIS, PRESENTATION AND DISCUSSION OF THE FINDINGS

5.1 INTRODUCTION

The preceding chapters of this dissertation introduced the research questions and research objectives. A broad literature study was also conducted to identify the GSCM challenges in the FMCG industry. In addition, in the preceding chapter, the research methodology that guided this study was presented.

This chapter deals with the analysis of the empirical data collected from the research sample during the empirical field research. The findings are presented, analysed and discussed and conclusions are drawn in relation to the objectives of this study. The empirical research consisted of semi-structured in-depth interviews and observation, using an observation checklist. The study aims to determine: (1) the GSCM challenges that Unilever faces; (2) the remedies Unilever has in place to overcome these challenges; and (3) the benefits that Unilever derives from GSCM. This chapter presents the findings from data collected at the Unilever-Indonsa factory, Riverhorse Valley, South Africa.

As noted previously in this study, the green supply chain challenges, remedies and benefits were identified from the literature review and in-depth semi-structured interviews with participants at Unilever. The observation focused on one of the primary objectives, which is to identify the remedies that Unilever has in place to overcome their GSCM challenges. Hence, this objective is covered in both parts of empirical study.

This chapter starts by revisiting the secondary objectives stated in Chapter 1. In this way, the reader is able to see which objectives have been achieved in the previous four chapters, and which objectives will be addressed in this chapter. The chapter covers issues discussed during the interview with the managers at Unilever which are important and relevant to the study. Thereafter, the data of the study are presented in the form of a thematic map. Firstly, green supply chain challenges which emerged from the data will be discussed. Each category and its specific codes are discussed individually to provide the reader with a comprehensive understanding of each theme, category and code. Subsequently, Unilever's remedies and benefits identified from the data will be

presented. Each theme, category and code is also discussed by referring to and quoting from the participants of the in depth interviews (i.e. the managers). Findings from the non-participant, structured observation will be presented in a separate section as it covers only one objective of the study.

This chapter also explains why Unilever in particular was chosen to participate in this study, and concludes with a summary of the most important issues discussed during the data analysis.

5.2 REVISITING THE RESEARCH QUESTION AND OBJECTIVES

Before discussing the data analysis and findings, it is important first to re-visit the research question and objectives to determine the focus of this chapter. To reiterate, the main research question of this study was:

"What are the GSCM challenges that Unilever faces and face and how can these be overcome?"

Table 5.1 serves as a summary of the research question and objectives of this study. It indicates the objectives and the chapters that relate to the attainment of the objectives.

Table 5.1: Research objectives and chapters covering the objectives

RESEARCH OBJECTIVE	SECONDARY DATA EMPIRICAL DATA
PRIMARY OBJECTIVES	
To determine the GSCM challenges that Unilever faces	Chapter 5, Section 5.6 to 5.10.
To determine the remedies Unilever has in place to overcome these challenges	Chapter 5, Section 5.11 to 5.11.4.4
To determine what the benefits are that Unilever derives from GSCM	Chapter 5, Section 5.12 to 5.12.2.5
SECONDARY OBJECTIVES	
To obtain a perspective of the FMCG industry, internationally and in South Africa.	Chapter 2, Section 2.3
To provide an overview of the scope and concept of SCM	Chapter 2, Section 2.2 to 2.2.3
To provide an overview of the scope and concept of GSCM	Chapter 2, Section 2.5.2 to 2.5.2.3
To identify important best practices in GSCM (served as a guideline to draw up the interview guide)	Chapter 3, Section 3.2 to 3.2.13
To identify green procurement challenges (served as a guideline to draw up the interview guide)	Chapter 3, Section 3.3.1 to 3.3.1.5
To identify green manufacturing challenges (served as a guideline to draw up the interview guide)	Chapter 3, Section 3.3.2 to 3.3.2.7
To identify green transportation and distribution challenges (served as a guideline to draw up the interview guide)	Chapter 3, Section 3.3.3 to 3.3.3.2
To identify challenges with regards to product recovery (served as a guideline to draw up the interview guide)	Chapter 3, Section 3.3.4 to 3.3.4.4

From Table 5.1, one notices that some of the objectives have been addressed in previous chapters, while others still need to be discussed as they were achieved through the empirical research. Many of these objectives will be discussed in the following sections

of this chapter. The section below presents the data collected and will analyse them to draw conclusions with regard to their meanings.

5.3 INTERVIEWS WITH THE UNILEVER-INDONSA FACTORY EMPLOYEES

As indicated in Section 4.3.2, the main reason for choosing Unilever as the participating company is that it is one of the largest FMCG companies in South Africa, impacting on the lives of many people through the wide range of brand categories they provide and the vital role they play in the South African economy.

This section contains the responses of eight participants (see Table 4.2) at the Unilever-Indonsa factory. The purpose of the interviews was to identify the GSCM challenges that Unilever faces, to determine the remedies Unilever has in place to overcome these challenges and the benefits that Unilever derives from GSCM.

As explained in Chapter 4, Section 4.4.1, an interview guide was drawn up and is attached as Appendix B. Participants were presented with different open-ended questions according to their tasks in their respective departments. Permission was granted to use a recording device during the interviews. The interviews took approximately 45 minutes and each participant suggested that, should any more information be required for this study, the researcher could email further questions to the participant. This was done in order to (1) clarify some points that were made and/or were not quite clear to the researcher and (2) to ensure that the findings were accurate and reliable in that they indicated exactly what the participants meant.

The interview guide consisted of six sections, namely:

- Section 1: a company profile
- Section 2: a general opinion-related section
- Section 3: green procurement
- Section 4: green manufacturing
- Section 5: green transportation
- Section 6: product recovery.

Sections 1 and 2 of the interview guide are analysed in sub-sections 5.4 and 5.5 respectively. Sections 3 to 6 of the interview guide are aligned with the four themes that emerged. The relevant data drawn from those sections of the interview guide are presented and analysed in subsections 5.6 to 5.10 of this chapter.

The participants answered all questions, except those questions already covered in the previous sections. Interviews were conducted with participants at executive and senior management level.

The next section of this chapter will focus on the analysis of the data collected during the interviews, and will present the thematic map which visually represents the findings of the data.

5.4 ANALYSIS OF DATA: SECTION 1

COMPANY PROFILE OF UNILEVER-INDONSA FACTORY

Before presenting the data and thematic map, it is important to briefly provide a profile of Indonsa factory. The sample size was discussed in Chapter 4. However, specific information relating to the factory, such as the size of the factory, legislative frameworks followed, company's vision, the number of employees, were not discussed as they form part of the data. Hence this section will outline important information provided by the production manager during the interview. This information is important to address before discussing the thematic map, as it will allow the reader to better understand the verbatim quotations used subsequently.

Unilever's R670-million plant was officially opened on the 9 December 2011, located at Riverhorse Valley, KwaZulu-Natal and named Indonsa, meaning "morning star" in Zulu. "The factory produces products sold under the Knorr, Knorrox, Rajah and Robertsons brands" (Southafrica.info 2011:1). According to Southafrica.info (2011:1), "Indonsa factory is a global first for the group in terms of advancing its focus on advanced sustainable green technology and it is Unilever's second-largest plant out of 250 worldwide, and is the company's fifth plant in South Africa".

A case study approach enabled the researcher to gain in-depth understanding of Unilever's company profile in relation to the green supply chain management challenges that this company faces and remedies it has in place to overcome these challenges.

5.4.1 Organisational structure

The organisational structure of Indonsa factory consists of three levels. The first level is the management team of managers in different departments led by the Sourcing Unit Director. The management team consists of the plant manager, SHE manager, human resource manager, finance manager, planning manager, logistics and transportation manager, engineering manager and quality manager. In this study, the participants were assigned letter from participant A to participant H in order to avoid disclosing their positions, thus maintaining confidentiality and anonymity. The second level includes the extended leadership teams of supervisors and unit leaders under each department. The third and final level is the shop floor workers.

5.4.2 Legislative framework and factory's production capacity

The Unilever-Indonsa factory upholds the legislated Occupational Health and Safety Act 85 of 1993, National Environmental Management Waste Act 59 of 2008, ISO 9001 Quality Standards and ISO 14000 Environmental Management Standards and Unilever Framework Standards. According to Southafrica.info (2011:1), the plant was designed to produce 65 000 tonnes of product per year and has an expansion capability of up to 100 000 tonnes, which would make it Unilever's largest dry foods plant worldwide since it covers 22 000 square metre, the equivalent of three soccer fields, and is situated on 78 000 square metres of land. The factory employs about 510 employees, 300 of who are permanent staff and 200 of who are seasonal employees.

5.4.3 Decision making flow at Unilever

Decision making at the Indonsa factory depends on the particular function that needs to be carried out. The head office makes many of the decisions, especially those pertaining to aspects such as innovation and new product development, to ensure that products reach the market place, whereas decisions pertaining to the "make function" is made by the management team at the factory. The make function refers "to make or process (a raw material) into a finished product, especially by a large scale industrial operation" (Lowell Centre for Sustainable Production 1998:103). Therefore, Unilever-Indonsa

factory employs a dynamic decision making approach which includes a combination of both centralised and decentralised decision making. As one participant indicated:

"This factory operates as a profit centre itself so we only make decisions pertaining to this factory alone since we are expert in the make function of the value chain." (Participant H).

The sourcing unit director indicated that decisions pertaining to bringing the product to the market, promotion, sales and customer development functions are driven from the head office in La Lucia, Durban. The management team at Indonsa factory only renders decisions pertaining to the "make function".

5.4.4 Vision of Unilever

This factory aimed at building and boosting local production capacity for consumer packaged goods.

"Our main vision is to double the size of business while reducing its negative impact to the environment."(Participant E).

Therefore, the Indonsa factory is committed to ensuring continuous minimisation of environmental impact through the entire product lifecycle and to strengthening the advancement of new technologies to achieve global sustainability objectives.

5.4.5 Environmental sustainability

According to Southafrica.info (2011:1), "the Indonsa factory has achieved carbon reduction by using energy efficient controlled zoned lighting throughout the plant, while innovative insulation methods reduce heat loads from the sun to minimise air conditioning requirements". Also, the factory has reduced energy usage levels through the installation of efficient motors drive mixers and air compressors.

"Rain falling on the 22 000 square meter roof is channelled into a 1.5-million litre tank, treated and added to recycled water." (Participant C).

The Unilever-Indonsa factory has implemented the recycling of solid waste to ensure that nothing is disposed of in the landfill. In addition, the smart water efficiency technology implementation at Indonsa factory reduces the supply of water needed from the municipality, enabling the recovery of 70% of all water used in production phases. The plant uses recyclable packaging material.

5.5 ANALYSIS OF DATA: SECTION 2

GENERAL

The aim of this section is to present what participants perceive to be the green supply chain challenges that Unilever faces and what remedies Unilever has in place to overcome these challenges.

In determining the GSCM challenges that Unilever faces, data from both the semi-structured in-depth interviews and the structured observations were used. Issues commonly brought up or experienced by participants were coded, categorised and grouped in the most logical way. GSCM challenges were categorised into green procurement challenges, green manufacturing challenges, green transportation challenges and product recovery challenges. As previously discussed, thematic data analysis was used to analyse the data. The result of this analysis provided the researcher with a 'thematic map'. Figure 5.1 presents the thematic map demonstrating the findings of the data analysis.

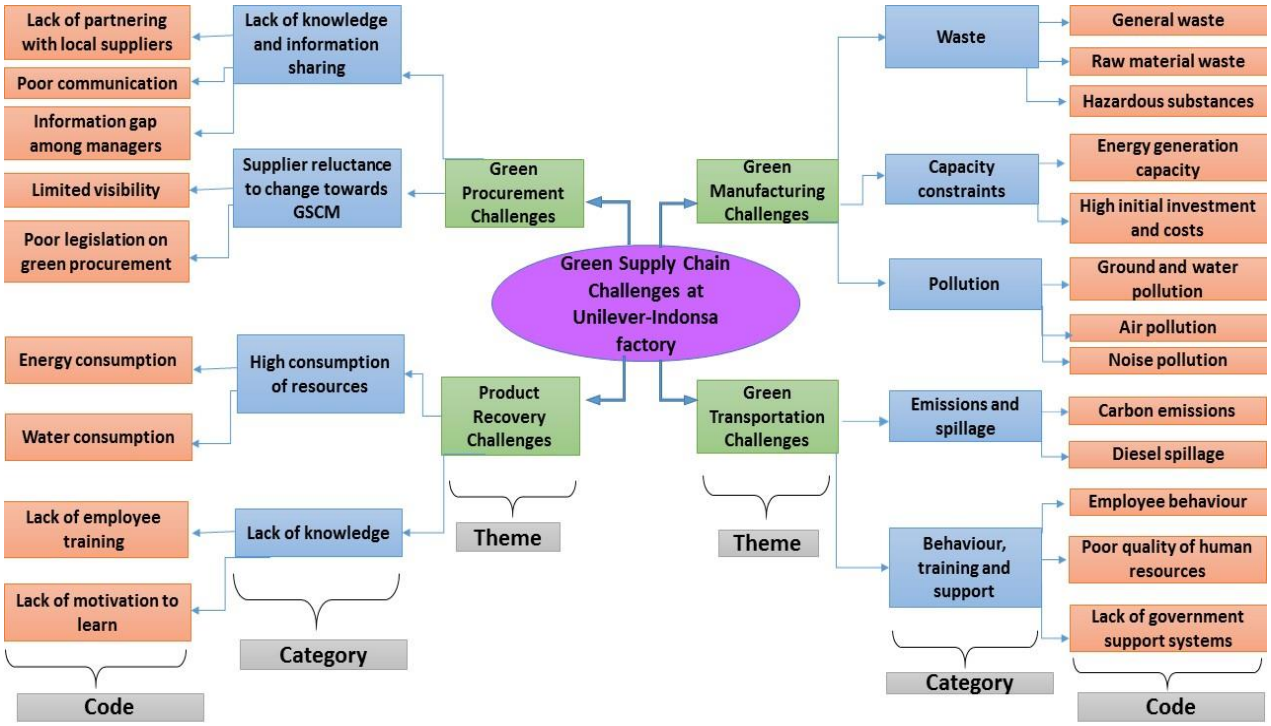

Figure 5.1: The thematic map

The subsequent sections of this chapter will 'unpack' the following four themes of the thematic map: green procurement challenges, green manufacturing challenges, green transportation challenges and recovery challenges. These themes are similar to the conceptual framework, because the emergence of categories of challenges articulated by the participant led the researcher to show the relationship between what empirical data show and the constructs driving the study. Each part of the map will be scrutinised and discussed to provide an in-depth understanding of all the issues that developed from the data. To support the findings, some of the sections will also provide verbatim quotes from the participants.

Since participants at the Indonsa factory consisted of managers (refer to Table 4.2) in different departments, different challenges were identified.

5.6 ANALYSIS OF DATA: SECTION 3

THEME 1: GREEN PROCUREMENT CHALLENGES

In Section 3.3.1 of the literature review, the framework of potential green procurement challenges was identified. This framework was used to inform open-ended questions in

the interview guide used during the empirical research study. The categories relating to this theme could be separated into two different categories: lack of knowledge and information sharing between upstream and downstream partners; and supplier reluctance to change towards GSCM. The categories and the codes relating to this theme will be extensively discussed in the following sections.

5.6.1 Lack of knowledge and information sharing between upstream and downstream partners

In Section 3.3.1.1 of the literature review, lack of knowledge and information sharing between upstream and downstream partners was identified as one of the potential green procurement challenges that FMCG companies face. This category was also identified by two participants as one of the most prominent green procurement challenges at Unilever. The participant B at the Unilever-Indonsa factory expressed his willingness to ensure that their procurement activities minimise negative impact on the natural environment. However, a lack of knowledge and information sharing between upstream and downstream partners creates impediments to Unilever's environmental sustainability initiatives. The codes relating to this category include local suppliers.

5.6.1.1 Lack of partnering with local suppliers

Suppliers are important business partners for Unilever to ensure that activities in the supply chain are carried out in accordance with internationally recognised principles for environmental sustainability. To achieve this, there has to be effective information sharing between Unilever-Indonsa factory and its suppliers in order to create strong partnerships. Supplier Relationship Management (SRM) factors as part of a Sustainable Operations Management agenda is essential in creating a strong partnership. This includes setting the requirements for suppliers, contractors and business partners to carry out procurement activities in an environmentally sustainable manner. Hence, inability to partner with the local suppliers is a challenge at the Unilever-Indonsa factory.

5.6.1.2 Poor communication

According to participant A and participant F at the Indonsa factory indicated that poor communication is one of their green procurement challenges. Effective communication

with suppliers ensures that the entire supply chain process, including managing inventory and acquiring goods, runs more smoothly and becomes more efficient. According to the three participants, it is essential to have dialogues with business partners on issues related to environmental sustainability. These dialogues can ensure sustainable SRM which includes supplier support and development (Schiele 2007). However, participants also indicated that it is difficult to manage a product once it reaches the end user.

5.6.1.3 Information gap among managers

Section 3.3.1.3 of the literature review identified an information gap among managers as one of the green procurement challenges in the FMCG industry. However, none of the participants reported that the information gap among managers is a challenge at Unilever-Indonsa factory since knowledge sharing regarding sustainability issues is strengthened during their daily meetings.

5.6.2 Supplier reluctance to change towards GSCM

Supplier reluctance to change with regard to GSCM was identified in Section 3.3.1.3 of the literature review as a potential challenge to green procurement in the FMCG industry. None of the participants at the Unilever-Indonsa factory reported that suppliers are reluctant to change towards GSCM. However, the procurement manager and planning manager indicated that they are concerned about the limited visibility to supplier activities.

5.6.2.1 Limited visibility

Limited visibility of supplier activities was identified by two participants in the purchasing and planning departments as a challenge in green procurement. Participant D reported that a lack of monitoring, of sufficient communication of sustainability expectations to suppliers and of evaluation of suppliers' corporate sustainability behaviour and performance is an impediment to green procurement.

Building long-term supplier partnerships, effectively monitoring procurement and incorporating sustainability and corporate social responsibility into the supply chain requires the adoption of the SRM concept. Moreover, suppliers, as stakeholders, play a

critical role in acting as change agents in operational efficiency and are in the position to transfer lessons learnt and best practices throughout the supply chain.

5.6.2.2 Poor legislation on green procurement

Poor legislation of green procurement was discussed in Section 3.3.1.5 of the literature review as a potential challenge in the implementation of green procurement initiatives. However, none of the participants reported this as a green procurement challenge at Unilever.

5.7 ANALYSIS OF DATA: SECTION 4

THEME 2: GREEN MANUFACTURING CHALLENGES

In Section 3.3.2 of the literature review, the framework of seven potential green manufacturing challenges in the FMCG industry was identified. These include:

- Lack of IT implementation
- Organisation's reluctance to adopt technology advancement
- Market competition and uncertainty
- Lack of implementing green practices
- Lack of top management commitment
- High initial investment and costs
- Lack of customer awareness and demand.

High initial investment and costs was identified by three participants as a challenge at the Unilever-Indonsa factory. None of the remaining six challenges were identified as a green manufacturing challenge at Unilever. Three participants reported that waste, capacity constraints and different types of pollution are challenges faced at Unilever. Therefore, the sections relating to this theme are separated into three different categories, namely, waste, capacity constraints and pollution. The categories and the codes relating to this theme will be extensively discussed in the section below.

5.7.1 Waste

Participant C indicated that waste is a challenge at the Indonsa factory and a driver for the implementation of sustainability initiatives. Considering the data set as a whole, general waste, raw material waste and hazardous substances were frequently mentioned, not only from the participants, but also in the interview with Participant G. Therefore, general waste, raw material waste and hazardous substances in particular pose a challenge in green manufacturing.

5.7.1.1 General waste

General waste at the Unilever-Indonsa factory includes waste from floor sweepings, vacuum waste, rubber bands, gloves, stores waste and workshop waste. The participants identified general waste produced during the cleaning of mixers as one of the prominent challenges. As quoted by the quality manager:

"All mixers have to be cleaned when changing over to a different product through either wet clean or dry clean." (Participant D).

Wet cleaning is done when there are allergens that could contaminate a new batch, whereas dry cleaning is done when allergen issues are not considered to be a problem, but in those cases, much powder waste in the cleaning process is generated. So, waste generation is a challenge for the Indonsa factory, especially since it is built near a river stream and within a residential area.

5.7.1.2 Raw material waste

Two participants reported that raw material waste at the Indonsa factory is a challenge. There are large amounts of material or energy used during the manufacturing or distribution of products and packages. It is essential that Unilever design, manufacture, purchase or use materials and products to reduce the amount or toxicity of what is thrown away through 'source reduction'. Waste can be stopped before it starts to conserve resources and packaging waste can be reduced, while performance, value and convenience continue to be provided to the consumer.

Unilever focuses on recycling already used materials and making them into another product; this begins at the end of a product's life, while source reduction first takes

place when the product and its packaging are being designed. In addition, the participants also indicated that Unilever over-orders the amount of packaging materials which results to a significant amount of packaging waste.

5.7.1.3 Hazardous substances

Two participants indicated that hazardous substances in the form of waste are another challenge at Indonsa factory. This includes waste in the form of liquid, gases, solids or sludge. Hazardous waste can be in the form of discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes. It is waste with a chemical composition or other properties that make it capable of causing illness, death, or some other harm to humans and other life forms when mismanaged or released into the environment. Some examples of hazardous substances waste are used oils, such as hydraulic oil, transmission oil, brake fluids and gear box oil.

5.7.2 Capacity constraints

Capacity constraints were identified by two participants as one of the green manufacturing challenges at the Unilever-Indonsa factory. Hence, the following sections discuss the two types of capacity constraints identified during the interviews. These are lack of energy generation capacity and high initial investment and costs.

5.7.2.1 Energy generation capacity

The inability for the Indonsa factory to be energy self-sufficient was identified by the engineering manager to be a challenge in the implementation of green initiatives.

"Lack of sustainable energy is a challenge to our greening initiatives since we have not invested in any solar or wind turbines and we are at the mercy of Eskom to provide us with electricity. The factory only focuses on system optimisation rather than changing it."(Participant G)

According to participant C, Unilever is still investigating some ways of generating energy for its factories, especially since there is the challenge of 'load shedding' in South Africa due to insufficient electricity. The next section discusses the challenge of high initial investment and costs.

5.7.2.2 High initial investment and costs

High initial investment and costs were identified in Section 3.3.2.6 of the literature review as a potential green manufacturing challenge in the FMCG industry. Insufficient financial capacity for investment in GSCM initiatives was also identified by one participant as posing hardships at the Indonsa factory.

"Generally sustainability initiatives do not have attractive business paybacks. So finding money to run project was very difficult especially at the beginning which made it even harder to invest back into sustainability projects. As much as Unilever provides capital expenditure for environmental sustainability, the funding is does not readily come." (Participant E)

Unilever makes an effort to solve this challenge by focusing on behavioural driven aspects, as they require less funding, such as urging employees to shut down machines when not in use, to conserve energy, to waste less and to focus on machinery settings to minimise waste during start-ups. The factory is involved in minimising raw material waste by strengthening control on big machines since accuracy is not always maintained during the filling of these machines. Therefore, Indonsa ensures less spilling and less wastage since all waste goes into recycling. So, the factory focuses on aspects that are dependent on machinery efficiency or people efficiency since these do not require any large investment.

5.7.3 Pollution

Participant G at Unilever identified pollution as one of the GSCM challenges. Pollution is created in various forms, such as ground pollution, water pollution, air pollution and noise pollution.

5.7.3.1 Ground and water pollution

Three participants indicated that ground pollution occurs when there is spill of chemicals or leakage in the underground storage tank, thus releasing heavy contaminants into the soil. Water pollution caused by industrial waste products that are released into rivers, streams and other water bodies is also a challenge.

5.7.3.2 Air pollution

Pollution in the form of exposure to dust is identified as a challenge in minimising negative environmental impact at Indonsa factory. Most this dust comes from production units. As a result, employees, contractors and visitors are urged to use personal protective equipment (PPE) such as hairnets, beard nets, coats and ear muffs when entering the production site. Air pollution at Unilever is caused by the injurious smoke emitted by cars, trucks and factory, which consists of sulphur dioxide, carbon monoxide and nitrogen oxides. This smoke is harmful to the environment, causing a lot of damage to man and the atmosphere. In addition, chlorofluorocarbons released from refrigerators and air-conditioners cause severe damage to the earth's environment.

5.7.3.3 Noise pollution

Participant G at Unilever identified noise pollution during the offloading of trucks and from the equipment on site as a challenge.

"We had noise complaints from our neighbouring community, so we built a booth where trucks can come in during loading and offloading, but this facility cannot be used because our employees inhales dust explosion inside this booth." (Participant G)

Also Participant G maintained that each piece of equipment is evaluated to determine the amount of noise it produces in order to implement strategies to reduce noise pollution. Noise pollution at the Unilever-Indonsa factory includes noise from cars and trucks, vehicle horns and factory equipment, which are harmful for the environment.

5.8 ANALYSIS OF DATA: SECTION 5

THEME 3: GREEN TRANSPORTATION CHALLENGES

Section 3.3.3 of the literature review identified the potential green transportation challenges that FMCG companies might face. Therefore, some of the open ended questions in the interview guide based on this theme were informed by the challenges identified on the literature review and the common concepts appearing from the empirical data. This theme covers green transportation challenges experienced at the Unilever-Indonsa factory. The four prominent categories identified by the researcher

include emissions and spillage, behaviour and personal motivation, poor quality of human resources, and the lack of government support systems.

5.8.1 Emissions and spillage

Participant G the Unilever-Indonsa factory indicated that emissions and spillages are challenges experienced in the transportation department at the factory.

5.8.1.1 Carbon emissions

The Participant G at the Indonsa factory indicated that carbon emissions emanated from transportation modes such as staff cars, trucks and other vehicles used onsite to transport goods or people.

"The largest sources of transportation-related greenhouse gas emissions include passenger cars and light-duty trucks, including pickup trucks, and minivans." (Participant G)

5.8.1.2 Diesel spillage

Diesel spills from delivery trucks were identified by two participants as a challenge. However, most participants in the transportation department did not identify it as a major challenge since there are mechanisms in place to avoid it. One participant was concerned about the diesel from trucks that drips out of the engines onto roads.

5.8.2 Behaviour, training and support

Three participants indicated that changing behaviours and promoting understanding about greening practices are key challenges at the Unilever-Indonsa factory. The poor quality of human resources and the lack of government support, as indicated in Section 3.3.3.1 and 3.3.3.2 of the literature review, will also be discussed in the following sections since this review was used to inform the open ended questions in the interview guide.

5.8.2.1 Employee behaviour

The Participant C identified changing employee behaviours, such as taking long showers, the use of plastic bags, not switching lights off and using products with more packaging as a challenge. Managers at Unilever accept that, in order to secure a more

sustainable future, current patterns of employee behaviour need to be modified.

Unilever has initiated numerous employee behaviour change interventions to address a range of issues, such as increasing recycling, reducing energy use, reducing GHG emissions, reducing water use and increasing public transport use. Three participants reported that attitudes and behaviours are complex and any strategy aimed at changing them must be based on thorough, interdisciplinary understanding. As indicated in Chapter 3, training and education are key requirements for accomplishing effective adoption and application of GSCM practices (Ravi & Shankar 2012).

5.8.2.2 Poor quality of human resources

Section 3.3.3.1 of the literature review identified the poor quality of human resources as a potential green transportation challenge in the FMCG industry. However, none of the participants identified poor quality of human resources as a green transportation challenge at the Unilever-Indonsa factory.

5.8.2.3 Lack of government support systems

Lack of government support systems was indicated in Section 3.3.3.2 of the literature review as a potential green transportation challenge in the FMCG industry. The transportation manager and the Participant G indicated that Unilever does not receive any kind support from government to help them successfully implement green transportation initiatives.

5.9 ANALYSIS OF DATA: SECTION 5

THEME 4: PRODUCT RECOVERY CHALLENGES

This theme covers recovery challenges experienced at the Unilever-Indonsa factory. The participants identified two prominent categories of challenges, which include high consumption of resources and lack of knowledge.

5.9.1 High consumption of resources

Participant G indicated that Unilever uses a large number of resources, such as energy and water, for various manufacturing activities. The following sections discuss energy consumption and water consumption at Unilever-Indonsa factory.

5.9.1.1 Energy consumption

The Indonsa factory consumes large amounts of energy and relies solely on the eThekwini municipality to provide electricity. Most of this energy (i.e. energy sources like oil, natural gas, and electricity) is used in four manufacturing units and across the entire factory for air conditioning, running equipment, lighting, and water heating and recovery.

5.9.1.2 Water consumption

According to Participant A at Unilever, a large amount of water is consumed at the Indonsa factory. Manufacturing processes run on a large scale; hence water is used on a large scale. Also, the factory has 510 workers, including contractors and casual labourers, who use water in various ways such as in bathrooms, toilets, hygiene stations and hot water coffee stations.

5.9.2 Lack of knowledge

Participant C indicated that a lack of knowledge about environmental sustainability is not challenge at Unilever.

5.9.2.1 Lack of employee training

During the interviews, none of the participants indicated that they had experienced problems with employee training since employees are encouraged to attend on-site training regularly.

5.9.2.2 Lack of motivation to learn

Two participants indicated that employees are not motivated and willing to learn about sustainability and there is no constant mentoring initiatives on sustainability. Also training on green supply chain management at Indonsa factory is not formalised.

5.10 GREEN SUPPLY CHAIN CHALLENGES IDENTIFIED

Table 5.2 provides a summary of the GSCM challenges identified from the interviews conducted at the Unilever-Indonsa factory.

Table 5.2: Identified green supply chain challenges

Section	GSCM Challenges Identified
Section 2 General	• Green procurement challenges • Green manufacturing challenges • Green transportation challenges • Product recovery challenges
Section 3 Theme 1: Green procurement challenges	Lack of knowledge and information sharing • Lack of partnering with local suppliers • Poor communication • Information gap among managers Supplier reluctance to change towards GSCM • Limited visibility • Poor legislation
Section 4 Theme 2: Green manufacturing challenges	Waste • General waste • Raw material waste • Hazardous substances Capacity constraints • Energy generation • High initial investment and costs Pollution • Ground and water pollution • Air pollution • Noise pollution
Section 5 Theme 3: Green transportation challenges	Emissions and spillage • Carbon emissions • Diesel spillage Behaviour, training and support • Employee behaviour • Poor quality of human resources • Lack of government support systems
Section 6 Theme 4: Product recovery challenges	High resource consumption • Water consumption • Energy consumption Lack of knowledge Lack of employee training Lack of motivation to learn

This concludes the section on the challenges Unilever faces. The next sections provide insight into Unilever's green supply chain best practices and the remedies the participating company has in place to overcome the challenges listed in Table 5.2.

5.11 UNILEVER'S REMEDIES TO OVERCOME THEIR GREEN SUPPLY CHAIN CHALLENGES

In determining Unilever's remedies to GSCM challenges, data from the semi-structured in-depth interviews and observation were used. Section 3.2 of the literature review provided a framework of green supply chain best practices for adopting GSCM. This framework was used to inform some of the open ended questions in the interview guide. This section will discuss Unilever's remedies to green procurement challenges, remedies to green manufacturing challenges, remedies to green transportation challenges and remedies to product recovery challenges.

5.11.1 Unilever's remedies to green procurement challenges

The procurement manager and planning manager indicated different remedies Unilever has in place to overcome green procurement challenges. These include adoption of green procurement, alignment of green supply chain objectives with the business objectives, and focus on source reduction to reduce waste.

5.11.1.1 Adoption of green purchasing/procurement

In Section 3.2.1 of the literature review, adoption of green procurement was identified as a green supply chain best practice. It was found that adoption of green purchasing/procurement is one of the remedies that Unilever has in place to overcome green procurement challenges. Unilever has initiated various best practices to eliminate challenges that impact on environmental sustainability. These include monitoring and controlling processes, and activities in the procurement department. Evaluating and monitoring is conducted to ensure that raw materials are obtained from sustainable suppliers. This helps to eliminate waste from the sources and throughout the entire supply chain.

5.11.1.2 Alignment of green supply chain objectives with the business objectives

Alignment of green supply chain objectives with business objectives was identified in Section 3.2.7 of the literature review as a green supply chain best practice. All participants at the Unilever-Indonsa factory reported that their GSCM activities are already aligned to their business objectives because all initiatives are planned from the top management in consideration of the overall objectives of Unilever business.

5.11.1.3 Focus on source reduction to reduce waste

Focus on source reduction to reduce waste is cited in Section 3.2.11 as a green supply chain best practice. Two of the participants indicated that effort is invested in making sure that waste is reduced at Unilever through various greening initiatives.

5.11.2 Unilever's remedies to green manufacturing challenges

The production manager at the Indonsa factory identified the remedies Unilever has in place to overcome green manufacturing challenges. These include promoting green manufacturing and making use of green supply chain analysis as a catalyst for innovation, an environmental scorecard, world class manufacturing (WCM) concepts, bonuses and process, variable speed drives, auditing and financial planning and dust and noise control.

5.11.2.1 Promoting green manufacturing

All eight participants indicated that one of the remedies at the Indonsa factory is to ensure that no waste goes to non-hazardous landfill sites. There should be a way of recycling, recovering, reducing and reusing waste to ensure management and minimisation of waste. In addition, Section 3.3.2 of the literature review cites promoting green manufacturing as one of GSCM best practices.

"Our waste is separated into different categories such as cans, cartons, refuse-derived fuel, plastic, paper, product waste and food waste for recycling." (Participant F).

There is a waste collection area in the Indonsa factory where all waste is collected for recycling. Waste like soft drink cans and plastic bottles are recycled, hairnets go into refuse-derived fuel (RDF), also known as specified recovered fuel, and leftover food from the canteen is also recycled. RDF is "a fuel produced by shredding and dehydrating solid waste with a waste converter technology" (Lamming & Hampson 2009: 97). Unilever complies with the National Environmental Management Waste Act 59 of 2008, which provides "norms and standards" that determine the requirements for the disposal of waste to landfill. It also upholds ISO 14000 in order to run business according to environmental standards.

"We do not use hazardous materials such as hazardous hydraulic oil and we also have a waste collection area onsite because we want to comply with environmental standards." (Participant G).

The idea behind this is to ensure that nothing is disposed of in the landfill and no spill accidents occur on site. Indonsa has a triple zero challenge, which forces employees to eliminate waste from the sourcing stage so that there will be no waste to deal with in the proceeding stages. Every amount of energy used on site is measured every month; every amount of water used on site and the waste that goes outside is measured. In other words, these factors are constantly measured. Having targets for each month and annually helps to keep the Indonsa factory on track.

"This helps us to see if the factory is moving towards the red zone and, provides us with reasons as to why we are moving towards the red zone and how we can solve this." (Participant H).

The Unilever-Indonsa factory has changed from using diesel forklift trucks to battery operated forklift trucks in order to handle goods on site. This initiative has played a critical role in reducing the GHG emissions caused by liquefied petroleum gas (LPG).

Participant D at the Indonsa factory is of the opinion that they can improve the reduction of emissions when they travel. For example, currently staff is using their own cars when travelling to work - there is no car-pooling system. A taxi service, however, is offered for shift workers. It is said that car-pooling can reduce the number of cars on the road, which impacts on green gas emissions.

Some of best practices or remedies that Unilever has in place to reduce waste generation are to optimise a run strategy in order to reduce the frequency in which mixer cleaning is taking place and to generates less waste. Indonsa has outsourced a company to assist in classifying waste to make sure that more waste is recycled rather is disposed of in the landfill. Indonsa puts effort into minimising the amount of waste coming out of production units and its green initiatives are driven by marketing strategies.

Unilever spends approximately R80 million on sustainability per year in all regions. Unilever has a sustainable living plan and all green initiatives are aligned to business objectives which are controlled from top level. Unilever-Indonsa upholds Unilever's sustainable living plan and all green initiatives are mandated from top management level to ensure that they touch the lives of many South African people and beyond. Thus, the Chief Executive Officer of Unilever had mandated that by December 2014. all Unilever factories (globally) should account for zero waste to landfill.

5.11.2.2 Use green supply chain analysis as a catalyst for innovation

Indonsa uses the systems applications products (SAP) audit. This is a form of an innovative green supply chain analysis and audit system. The system comprises an audit of a computer system from SAP to monitor security and integrity of data. It is a system that provides users with a real-time business application. With this system, Indonsa is able to maintain integrity of data.

"This system allows us to ascertain how much each unit is consuming and whether the factory is still on its target or not, it gives more visibility and it is real time." (Participant C).

SAP is used as an online monitoring system at different stages to allow for tracking of material waste and energy usage through the entire plant. Section 3.2.10 of the literature review also identified as a best green supply chain practice the use of green supply chain analysis as a catalyst for innovation. Lamming and Hampson (2009:47) maintain that the analysis of the green supply chain offers a chance to review the procedures, materials and concepts of the operation. It also targets misused material, wasted energy or effort and resources that are under-utilized.

5.11.2.3 Environmental scorecard

Unilever has an environmental scorecard which is related to energy consumption and GHG generation. Progress is tracked through a scorecard that maps energy fluid flows on site. As part of the environmental scorecard, the factory has been designed to minimise energy usage by using variable speed drives (VSD). The factory also has automated the flushing of toilets and has installed automated sensors on water taps in the bathrooms. Unilever also has hygiene stations as you enter the factory.

"The limited amount of natural resources is used as well as the amount of energy since the factory does not use boilers at all, so there are no emissions coming from the generation of steams." (Participant G).

Various pieces of equipment on the manufacturing site are not run simultaneously. The factory has an energy management system that controls the air conditioning in the plant; it maintains it to a certain temperature by switching off automatically all the areas that are already cool. The building was designed in such a way that it uses natural light so that there is no need for excessive lighting inside the plant.

5.11.2.4 World class manufacturing concepts

Unilever's environmental score card is driven by WCM concepts. These are a collection of concepts which set standards for production and manufacturing. WCM starts from the theoretically ideal situation; this means that involved employees have the production processes always running without losses. It is the collective term for the most effective methodologies and techniques to realize these objectives:

- Products of consistent high quality
- Delivery on time in full amount ordered
- Products at the lowest possible cost level.

"Indonsa factory utilizes WCM concepts to implement best practices and also invent new practices as to stay above the rest in the manufacturing sector in terms of environmental sustainability." (Participant H).

The aim is to remain the best in terms of quality, cost effectiveness, flexibility and innovation. This world class manufacturer implements robust control techniques.

5.11.2.5 Bonuses and prices

According to some participants during the empirical study, all shop floor workers in the factory are measured with regard to waste and they receive bonuses when they reduce the waste they produce. Therefore, waste is one of the KPIs used in order to reduce water usage by 10%, energy by 10% and waste (non-hazardous waste to zero landfill).

"Every employee in the factory has a waste target, from managers to machine operators in order to drive down waste in their respective tasks since they are rewarded based on that. Also, during sustainable living workshops, employees receive prizes such as iPads for taking part in promoting environmental sustainability." (Participant D).

"We hosted a competition whereby the shop floor workers were asked to create handmade objects such as bags, book covers and many other useful items using waste materials." (Participant H).

5.11.2.6 Variable speed drives

According to the managing director, the factory contributes largely in reducing the amount of energy used through air compressors. Any air leaks are identified and fixed timeously. The factory also uses VSDs on compressors to reduce the energy output of a compressor, by controlling the speed of the motor, ensuring that it does not run faster

than necessary. Using a variable-speed AC drive is one of the most effective ways to save energy. While other energy saving methods may shave single percentage points off the overall consumption, a variable-speed drive frequently saves 30 percent or more of the energy in many centrifugal compressor applications. A VSD air compressor is an air compressor that takes advantage of variable-speed drive technology, hence, reducing power cost, reducing power surges and delivering a more constant pressure.

5.11.2.7 Auditing and financial planning

Four of the participants indicated that internal auditing and financial planning is one of the effective monitoring and control mechanisms in place to ensure that environmental sustainability activities are uninterrupted. The Indonsa factory conducts environmental internal auditing against safety standard and environmental standards. It ensures compliance with local regulation on how much waste water is discharged. For example, waste water is not discharged without a permit from municipal government, and waste water is checked every month to ensure that pH is between 6 and 10, because the municipality fines the company if this is not the case. pH is "a numeric scale used to specify the acidity or alkalinity of an aqueous solution" (World Health Organisation 2003:1).

In addition, Unilever-Indonsa plans for its financial expenditure on green initiatives. Some of these plans include pay back calculations or discounted cash flow calculations. The benefit cost ratio is worked out to stipulate how much the initial cost and the benefit will be over a year. That amount is divided by two to get a ratio. This is an evaluation method used to estimate the attractiveness of an investment opportunity. In essence, a ratio of any amount bigger than four is considered worthwhile. So, the company must gain a profit of four times amount of what was invested initially. As one participant reported:

"A lot of capex (capital expenditures) that was proposed up front had a lot to do with making the factory, a sustainable and green factory. So some of the examples includes installation of variable speed drives, water treatment facility and senses used for the activation of water flow. So, Indonsa factory is already designed with a lot of these features in place." (Participant D).

5.11.2.8 Dust and noise control

Participant G at Unilever indicated that there are mechanisms in place to control noise and dust. For example, employees, contractors and visitors are provided with PPE, such as hairnets, beard nets, coat and ear muffs when entering the production site. In addition, the factory has been designed to contain dust and control noise. The equipment is evaluated to determine the amount of noise it produces in order to implement strategies to reduce noise pollution.

5.11.2.9 Product group development

Indonsa is of the view that it is important to monitor, repair and upgrade equipment to ensure that energy is utilised by running productive equipment. The upgrade of any equipment is a head office function, called product group development (PGD), whereby it is determined whether the business is growing or not. The areas where the factory cannot supply enough to the market are identified and a recommendation will be made for the purchase of a new machine by focusing on the outputs and capacity in the previous year. In other words, PGD will look at the rate of demand growth for the product and it will be determined whether it is necessary to procure new machinery or not. If any of the equipment needs to be serviced, there is a maintenance programme in place. However, the project management office (PMO) is involved in the case of lubrication. PMOs are used to "analyse and collectively manage current or proposed projects based on numerous key characteristics" (Ravi & Shankar 2012:84).

With this programme, it is easy to know if a machine needs to be serviced or changed by looking at its vibration. Equipment is checked in every quota and there is a proper plan from the engineering team, which aims at addressing problems associated with equipment. Forklift trucks are serviced annually and there is a battery area where forklifts' batteries are checked to determine whether they are still in a good condition. This programme contributes to energy reduction systems, energy monitoring, regression analysis, chiller optimisation, and compressor optimisation and adiabatic cooling.

5.11.3 Unilever's remedies to green transportation challenges

Participant F identified remedies that Unilever has in place to overcome green transportation challenges. These are KPIs and on-site truck inspection.

5.11.3.1 Key performance indicators

The KPIs on waste and waste reduction targets are some of the GSCM best practices at Unilever in order to remedy green supply chain challenges. KPIs indicate various aspects, such as ensuring that all transportation service providers comply with the terms and conditions of the contract and Unilever's environmental standards.

5.11.3.2 On-site leakage inspection

Participant F indicated that all trucks entering the Indonsa premises are inspected for any leakages. Also, outsourced transportation companies sign a binding contract to be sustainable before they enter into business. For example, a contract may forbid a truck that is leaking oil on site, and the contract may make provision that petrol leaks must be covered or contained so that petroleum gas may not leak onto the ground and be flooded into storm water drain when it raining. As one participant explained:

"We inspect trucks for gas and smoke leakages. Should a truck produce an accepted amount of smoke, drivers will be told to keep engine off when parked. Truck drivers may be told not to bring the truck into the grounds, until any of these problems are fixed. So truck operators are trained to deal with all these issues." (Participant F).

5.11.4 Unilever's remedies to product recovery challenges

Participant D and the engineering manager indicated four strategies that Unilever has in place to overcome product recovery challenges to of waste, water and energy. Section 3.2.14 of the literature review reveals managing utilisation of energy and water as one of the green supply chain best practices. Some questions in the interview guide were informed by this section. Therefore, the following sections will discuss rain water harvesting, energy mapping, motion sensor light switches and staff meetings to promote water and energy recovery.

5.11.4.1 Rain water harvesting

The Indonsa factory has invested between R30m to R40m into the water recycling plant. The factory has neutral rain water harvesting facilities to minimise their reliance

on the municipality to supply them with water. The factory has rain water catchment tanks and the roof of the Indonsa factory is designed to collect the maximum amount of water during rainy seasons so that it can sustain itself for a year. Hence, the factory relies on municipal water only during winter seasons. The Indonsa factory is built on wet land; some of this wet land is preserved in order to keep a wildlife area with a thriving ecosystem of birds. A participant elaborated:

"Now we are in the process of implementing water mapping which is similar to energy mapping, water meters will be place in all manufacturing units and the entire factory. This will be incorporated with storm water drainage system using gutters." (Participant A).

This will help to measure the amount of water used in each section or unit and it will be easy to determine why a certain amount of water was used. This will also enable the municipality to see if there is any water not accounted for, which could, for example, be the result of underground pipe leakages. In addition, there are automatic sensor water taps in the hygiene stations. These taps control the flow of water and the taps only run when the hands are placed under the spout, limiting the water use to the precise time required and preventing taps being left running.

5.11.4.2 Energy mapping

Participant C and Participant G drive initiatives to ensure compliance with environmental standards and legislative frameworks on sustainability. One of these initiatives is rain water harvesting. All eight participants indicated that the Indonsa factory has a system called energy mapping. This is the energy management action plan aimed at ensuring efficient management of energy consumption in the factory. This is one of the control strategies to reduce energy costs by implementing measures that do not require significant investment. Energy mapping enables the identification of energy savings opportunities along with the identification of how other renewable energy sources could be integrated into the overall energy supply mix. This system provides a

visual representation which allows for ascertaining the amount of energy used in each unit and department per month.

5.11.4.3 Motion sensor light switches

The factory uses motion sensor light switches to control lighting in the factory. It is not easy to keep everyone accountable for turning off the lights as they leave a room. Therefore, these sensors provide benefits in specified building areas, such as corridors, restrooms and conference rooms, and training rooms.

"Our plant has motion control sensors that controls lights in the building. So, if there is no one in the room, the lights go out and when someone walks into the room, the lights come on." (Participant D).

When a person enters one of these rooms, the motion sensor will detect movement and switch on the light. When the person leaves, the light will go out after a set period of time. This ensures that lights are not left on needlessly for hours or even days. In addition, energy saving light bulbs with a lower voltage are used at the plant.

5.11.4.4 Staff meetings

Participant C indicated that every month, all unit managers, as drivers of sustainability, engage with shop floor employees to explain environmental health, safety and sustainability. Every quarter, the plant manager engages with the director, twice a year, a director engages with managers on sustainability issues.

"We try to educate employees on frequent basis. Also there are different platforms and forums, daily operator's meetings where operators are involved." (Participant C).

Compressor air leak service artisans are also challenged to do energy reduction and they are involved in all environmental sustainability initiatives.

This concludes the section on the remedies to overcome identified challenges. Table 5.3 summarises the identified GSCM and the remedies Unilever has in place to overcome these challenges.

Table 5.3: Identified green supply chain challenges and remedies Unilever has in place to overcome the challenges

Section	GSCM Challenges Identified	Remedies Unilever Has In Place
Section 2 General	• Green procurement challenges • Green manufacturing challenges • Green transportation challenges Product recovery challenges	Unilever's remedies to: • green procurement • green manufacturing • green transportation • product recovery
Section 3 Theme 1: Green Procurement Challenges	Lack of knowledge and information sharing • Partnering with local suppliers • Poor communication • Information gap among managers Supplier reluctance to change towards GSCM • Limited visibility Poor legislation	Adoption of green purchasing/procurement • Alignment of green supply chain objectives with the business objectives • Focus on source reduction to reduce waste
Section 4 Theme 2: Green Manufacturing Challenges	Waste • General waste • Raw material waste • Hazardous substances Capacity constraints • Energy generation • High initial investment and costs • Ground and water pollution • Air pollution • Noise pollution	• Promoting green manufacturing • Use green supply chain analysis as a catalyst for innovation • Environmental scorecard • World class manufacturing concepts • Bonuses and prices • Variable speed drives • Auditing and financial planning • Dust and noise control • Product group development
Section 5	Emissions and spillage	• KPIs

Theme 3: Green Transportation Challenges	• Carbon emissions • Diesel spillage Behaviour, training and support • Employee behaviour • Poor quality of human resources Lack of government support systems	• On site leakage inspections
Section 6 Theme 4: Product Recovery Challenges	High resource consumption • Water consumption • Energy consumption • Lack of knowledge Lack of employee training • Lack of motivation to learn •	• Rain water harvesting • Energy mapping • Motion sensor light switches • Staff meetings

The next section deals with the benefits Unilever derived from adopting a green supply chain.

5.12 BENEFITS DERIVED BY UNILEVER FROM ADOPTING GREEN SUPPLY CHAIN

This section covers the broad ideas or perspectives of the participants with regard to the benefits that Unilever derives from adopting green supply chain initiatives. Two categories appeared from the data: they are financial benefits and non-financial benefits.

5.12.1 Financial benefits

Participants at the Unilever-Indonsa factory indicated that managing a green supply chain is about finding the balance between the economic and environmental benefits. It covers everything from environmental awareness and involvement and capturing, measuring and reporting GHG emissions, to finding ways to divert material from waste streams and modifying business practices to reduce the use of energy. As with most new activities introduced at Indonsa, sustainability is not easy and not cheap, but it could improve the company's operations and bottom line.

- **Cost savings opportunities**

Unilever realises cost savings from the practices of recycling waste and switching to energy-efficient light bulbs to changing product packaging and reducing the carbon footprint. Unilever's waste reduction programmes results in impressive savings through reduced purchasing, operating, and storage costs. In addition, Indonsa derives substantial cost savings by adjusting waste removal contracts to reflect reduced volumes of waste and incorporating waste reduction principles into the daily operations.

5.12.2 Non-financial benefits

All eight participants revealed that Unilever-Indonsa realises some non-financial paybacks from waste prevention, recycling, composting and the purchase/manufacture of goods that have recycled content or produce less waste. The following sections discuss the non-financial benefits of green supply chain which include brand reputation, waste prevention and reduction, compliance to environmental legislation, better business practices and competitive advantage.

5.12.2.1 Brand reputation

Better brand image was indicated as the greatest benefit that Unilever derives from green supply chain. Studies consistently show that consumers prefer to do business with companies that value and care about the environment and have a strong track record of sustainability. Section 2.8.3 of the literature review indicates that the benefits of adopting GSCM include a good corporate image. Also, product differentiation and competitive advantage is indicated in Section 2.8.7 of the literature review as reinforcing the image of the brand and improving a positive reputation in the market place (Lamming & Hampson 2009:48). Many, in fact, are demanding that companies go green. For example, consumers expect Unilever to recycle and possibly reuse waste and keep waste out of landfills. Consumers are looking for organically grown, sustainable products. They appreciate FMCG manufacturers that purchase raw materials, such as flavours and herbs, from local farmers, support the local community and reduce the carbon footprint to transport the produce to the market.

Companies that are good stewards of the environment like Unilever earn the goodwill, trust and, most importantly, loyalty of their customers.

5.12.2.2 Waste prevention and reduction

Unilever-Indonsa has minimised waste at its source and minimised the quantity required to be treated and disposed. This was achieved through better product design and/or process management. Waste reduction included the complete range of measures and actions taken up before a sub-standard, material or product becomes waste. Unilever has reduced waste by reusing and recovering products or their components. This includes preparing for reuse, recover and recycling. Preparing for reuse includes checking, cleaning or repairing recovery operations by which products or their components that would have become waste are prepared in such a way as to be reused without any other pre-processing. Hence, these products or components are no longer waste and are used again for the same purpose for which they were intended.

An example of waste reduction at the Indonsa factory is reducing unnecessary packaging from manufactured products and produce. If this excess packaging could be avoided, no one would have to be concerned with the cost and effort of collecting the excess packaging, separating it for recycling, breaking it down, transporting it to manufacturers and then integrating the recycled materials back into the manufacturing process.

Waste reduction also helps conserve resources for future generations and contributes to a cleaner environment. Unilever has achieved this by:

- Using fewer raw materials in their manufactured products
- Avoiding or minimising the use of hazardous substances in the manufacturing processes
- Increasing the life span of their products by making them more durable and easier to repair
- Cutting back on the amount of packaging associated with their products
- Making product packaging reusable
- Investing in equipment that helps reduce waste, such as high quality, durable, repairable equipment.

5.12.2.3 Compliance with environmental legislation

Unilever's sustainable living plan is aligned with the South African National Environmental Management Act 107 of 1998, which was amended by the National Environmental Management Act 56 of 2002 and the recent National Environmental Management Laws Amendment Act 14 of 2008. The act states that, "everyone has the right to an environment that is not harmful to his or her health or wellbeing". Unilever has, therefore, initiated various strategies to ensure that it does not violate that right.

5.12.2.4 Better business practices

As a result of their efforts to manage green supply chains, Unilever has become much better at developing, implementing, and tracking metrics. In some instances, they have to do it to meet government laws and regulations. In other instances, they chose to because they know the metrics will help them track and improve their sustainability function and thus their business operations.

Monitoring metrics has also changed the perspective about a company's performance to much longer periods of time than just quarter to quarter. Precise metrics has enabled Unilever's senior management, other stakeholders, and key investors to project the company's strength and stability well into the future.

5.12.2.5 Competitive advantage

Together, all of the benefits, such as lower costs, better brand image and better business practices, create a competitive advantage for Unilever as a whole. Indonsa adheres to sustainability practices and manages green supply chains, which has resulted in them realising more efficient business operations and greater profits, as they are rewarded with increased sales by their loyal customers.

This concludes the second section on the benefits that Unilever derives from GSCM. The next section presents the findings obtained from the observations.

5.13 FINDINGS: OBSERVATION ANALYSIS

Once the literature review and the empirical study (interviews with participants at Unilever) was concluded, the researcher was able to compile an observation checklist to

augment the empirical study. The researcher was afforded the opportunity to work at Unilever, Riverhorse factory for one month as an intern. This provided him with the opportunity to observe the functioning of the factory.

This section provides the findings from the observation phase of the study. The presentation of observation findings is divided into five tables with the relevant discussion following each table. The aim was to determine the remedies that Unilever has in place to overcome GSCM challenges by noting features present at Indonsa factory to eradicate identified GSCM challenges.

The observation analysis focused on only one primary objective, namely, to determine the remedies that Unilever has in place to overcome GSCM challenges. It is for this reason, that the findings of the observation analysis are presented separately below and not integrated in the themes, categories and codes in the analysis of the in-depth interviews.

The researcher used a check-list (discussed in Section 4.5.1) for evaluation. If the feature was present at Indonsa factory, the researcher ticked (√) on the YES column to indicate that the specific feature exists; if the feature was lacking at Indonsa factory, the researcher ticked the NO column; if the feature was not applicable at the Indonsa factory, the researcher ticked the not applicable (N/A) column. In addition, a section for the observer's comments was provided should any further explanation for an observed feature be deemed necessary.

Table 5.4 presents the features at the Unilever Indonsa factory in relation to the building design of the factory followed by brief discussion of these features.

Table 5.4: Observation analysis of building design of Indonsa factory

Activity	Please tick (√)		
	YES	**NO**	**N/A**
5.4.1.1 Indonsa factory is designed to ensure efficient use of resources such as energy, water and raw materials.	√		
5.4.1.2 Sustainable designed warehouse to reduce operation costs and environmental impacts, and increase building resiliency.	√		
5.4.1.3 Indonsa factory is designed to maximise the use of renewable energy sources.	√		
5.4.1.4 Indonsa factory is a sustainable building that uses water efficiently, and reuse or recycle water for on-site use.	√		
5.4.1.5 Building material prevents upstream pollution, and conserves resources. Building is also designed to use and reuse materials in the most productive and sustainable way across its entire life cycle.	√		
5.4.1.6 Indonsa building maximises daylighting, has appropriate ventilation and moisture control, optimises acoustic performance, and avoids the use of materials with high-GHG emissions.	√		
5.4.1.7 The following characteristics describe/do not describe Indonsa factory:			
• Careful building design to reduce heat loads, maximising natural light and promoting the circulation of fresh air.	√		
• Energy-efficient air conditioning and lighting.	√		
• Using environmentally friendly, non-toxic materials.	√		
• Reducing waste and using recycled materials.	√		
• Water-efficient plumbing fittings and water harvesting.	√		
• Using renewable energy sources	√		

The features shown in Table 5.4 include equipment to ensure efficient use of resources such as energy, water and raw materials. Some of these features have been already discussed in Section 5.7. Unilever's warehouse has been designed to reduce operation costs and environmental impact, and to increase building resiliency. For example, the building material prevents upstream pollution and conserves resources such as maximising daylight, appropriate ventilation and moisture control, optimises acoustic performance and avoids the use of materials with high GHG emissions. In addition, the Indonsa factory is carefully built to reduce heat loads, maximising natural light and promoting the circulation of fresh air, energy-efficient air conditioning and lighting, water-efficient plumbing fittings and water harvesting are provided.

Table 5.5 the features at the Unilever Indonsa factory in relation to Green Procurement.

Table 5.5: Observation analysis of Green Procurement

Activity	**Please tick (√)**		
	YES	**NO**	**N/A**
5.4.2.1 Purchased recycled paper is used to make packages for the four product categories (i.e. Knorr, Robertsons, Knorrox, and Rajah) at Indonsa factory, as these generally have a much lower impact on the environment.	√		
5.4.2.2 Order merchandise with minimal packaging, in concentrated form, or in bulk.	√		
5.4.2.3 Suppliers do not over package orders.	√		
5.4.2.4 Purchased materials are suitable for easy biodegrading since they can break down speedily and safely.	√		
5.4.2.5 Products made up of different types of materials, particularly plastics and metals, are designed to be easily taken apart or disassembled so that the materials can be recycled.	√		
5.4.2.6 Indonsa factory ensures that purchased materials does not have a 'knock-on' effect of using more resources since it uses hand-driers over towels which may decrease the volume of paper disposed.		√	

Activity	Please tick (√)		
	YES	NO	N/A
5.4.2.7 Indonsa factory purchased long-life equipment, that will survive being mistreated, that can be repaired, reused and ultimately recycled. Enable to be upgraded and improve performance over time rather than having to buy new equipment to do the same job.	√		

Features noted to be present in relation to green procurement include the purchasing of recycled paper used to package the four product categories (i.e. Knorr, Robertson's, Knorrox and Rajah) at the Indonsa factory, as these generally have a much lower impact on the environment. It was also noted that order merchandise has minimal packaging, arriving in concentrated form or in bulk. Purchased materials are suitable for easy biodegrading since they can break down speedily and are designed to be easily taken apart or dissembled so that the materials can be recycled.

Table 5.6 presents the activities at the Unilever Indonsa factory in relation to Green Manufacturing followed by a brief discussion of these activities.

Table 5.6: Observation analysis of Green Manufacturing

Activity	Please tick (√)		
	YES	NO	N/A
5.4.3.1 The use of biodegradable and recyclable packaging material such as paper and cardboard, items made from corn starch, bubble wrap, and biodegradable plastic.	√		
5.4.3.2 Waste is avoided in packing area.	√		
5.4.3.3 Optimised use of refrigeration and chilling.	√		
5.4.3.4 Lights are switched off in refrigeration areas when not in use	√		

Activity	Please tick (√)		
	YES	NO	N/A
5.4.3.5 Refrigeration doors are kept closed to prevent cool air from escaping.	√		
5.4.3.6 Manufacturing machinery and equipment is upgraded or replaced (every after one year).	√		
5.4.3.7 Overcooling is prevented to minimise energy costs and improve efficiency	√		
5.4.3.8 Indonsa factory uses manufacturing machines that are in good working condition and certified as environmentally sustainable.	√		
5.4.3.9 Promoting green cleaning and recognising safer consumer and industrial and institutional products through safer product labelling.	√		
5.4.3.10 Improved technology and design tactics to expand the scope of products and incorporating eco-efficiency into design tactics.	√		
5.4.3.11 Cooling system using of water chillers works efficiently.	√		
5.4.3.12 Chillers are witched off when not required through automatic controls.	√		
5.4.3.13 Indonsa factory invest in equipment of high quality, durable, and repairable to minimise waste and reduce costs.	√		

Manufacturing is the largest part of the supply chain at Unilever-Indonsa factory and numerous features were observed in this section. It was noted that waste is separated according to its characteristics in the manufacturing and packing area, to allow for easy recycling and reuse. The factory uses low energy light and equipment and it is in good working condition and certified as environmentally sustainable. Unilever's maintenance team conducts regular checks on the equipment. Technology and design tactics are used to expand the scope of products and incorporate eco-efficiency into design tactics. The cooling system, such as water chillers, works efficiently and is switched off when not

required through automatic controls. The Indonsa factory invests in equipment of high quality, which is durable, and repairable, to minimise waste and reduce costs.

Table 5.7 presents the features at the Unilever Indonsa factory in relation to Green Transportation followed by a brief discussion of these features.

Table 5.7: Observation analysis of Green Transportation

Activity	**Please tick (√)**		
	YES	**NO**	**N/A**
5.4.4.1 Ordered materials are shipped in returnable containers			√
5.4.4.2 Minimised movement and waste that occurs when temporarily locating, filing, stocking, stacking, or moving materials, people, tools, or information.		√	
5.4.4.3 In a warehouse, travel time and movement of people and materials by forklift (material handling) is measured and evaluated.		√	
5.4.4.4 Indonsa factory uses plastic pallets for handling materials rather than wooden pallets.	√		
5.4.4.5 Indonsa factory uses battery operated forklift trucks instead of LPG.	√		
5.4.4.6 There are no LPG gas leakages in the delivery trucks and forklift trucks.	√		

The researcher observed transportation features and the movement of raw materials and finished goods on site. Plastic pallets are used for handling materials as they are not as harmful to the environment as wooden pallets. Battery operated forklift trucks are used instead of LPG. Delivery trucks and forklift trucks were observed daily for one month and there were no LPG gas leakages noted.

Table 5.8 presents the features at the Unilever Indonsa factory in relation to Product Recovery followed by a brief discussion of these features.

Table 5.8: Observation analysis of Product Recovery

Activity	Please tick (√)		
	YES	NO	N/A
5.4.5.1 Use of environmental sustainable technological equipment to collect water.	√		
5.4.5.2 Use of environmental sustainable technological equipment to treat water.	√		
5.4.5.3 Recovering energy sources and using equipment that consume less energy and release less GHG into the environment.	√		
5.4.5.4 RDF or solid recovered fuel waste is used to produce energy.	√		
5.4.5.5 Indonsa factory facilitates the recycling and reusing of waste material by separating, collecting and remanufacturing or converting used or waste products into new materials (e.g. paper, plastic, and glass).	√		
5.4.5.6 Foam packaging pellets and cardboard boxes are reduced, recovered, reused and recycled.	√		

Communal features observed in relation to recovery section included the use of environmentally sustainable technological equipment to collect and treat water. Hygiene stations have timed electronic sensor taps to avoid water wastage. In addition the factory has a waste area where it is collected for recycling because Unilever facilitates the recycling and reusing of waste material by separating, collecting and remanufacturing or converting used or waste products into new materials (e.g. paper, plastic, and glass). The researcher observed items made by the shop floor workers using packaging waste material.

In addition, features not present at Indonsa factory include the lack of hand-driers in the hygiene station. As a result employees use more paper towels, which may increase the volume of paper wasted. Other features not present at the Indonsa factory include the lack of returnable containers because the raw materials, packaging materials and

finished goods are perishable and do not allow for returnable containers to be used during transportation activities. Also, there are no mechanisms to minimise movement and waste that occurs when temporarily locating, filing, stocking, stacking, or moving materials, people, tools or information. Finally, it was noted that travel time and movement of people and materials by forklift (material handling) is not measured.

5.14 SUMMARY

Chapter 5 served as the data analysis chapter of this study. The chapter commenced by revisiting the objectives of the study, firstly, indicating which objectives were covered before the data analysis and, secondly, indicating which objectives the chapter aimed to address.

The chapter provided the background information regarding the interviews and the company profile of the Indonsa factory. Before the most prominent challenges, remedies and benefits were discussed, a brief background was painted of some of the important issues evolving from the interview with the participants (managers) at Unilever.

This was followed by the data analysis section of the chapter. Consideration was given to the responses obtained from the participants during the interviews. Four general themes were identified, namely, green procurement challenges, green manufacturing challenges, green transportation challenges and product recovery challenges. Different categories and codes were developed for each theme in order to arrange the empirical data in a meaningful order. A summary of green supply chain challenges and a summary of the findings of the observation analysis were presented and discussed.

The next chapter, Chapter 6, concludes this dissertation by summarising the main findings. Each objective will be considered individually, revisiting both the literature and the empirical findings of each objective in order to draw conclusions and make recommendations.

CHAPTER 6

SUMMARY, RECOMMENDATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

6.1 INTRODUCTION

In previous chapters, the problem statement, objectives, literature study and empirical data analysis were presented. Chapter 5 presented the findings of the empirical data and the discussion of this. This concluding chapter presents a summary of the study, recommendations and suggestions for future research.

The primary objective of this research study was to identify the green supply chain challenges that Unilever faces and to determine the remedies Unilever has in place to overcome these challenges and the benefits that Unilever derives from GSCM. This chapter serves as an overarching summary of the dissertation. Each objective is considered individually by summarising the literature and empirical findings, drawing conclusions and providing recommendations on how to overcome the identified challenges. After the discussion of each objective, the chapter concludes by discussing the limitations of the study and also by making recommendations for future research on a similar topic. The concluding section of this chapter summarises the main discussions and findings of the study.

6.2 REFLECTING ON THE RESEARCH QUESTIONS AND OBJECTIVES

This chapter reflects on the main research objectives and questions of the research study. These formed the basis of this research study and it is important to indicate how they have been achieved and met during the course of the study. Some of the objectives were reached by consulting the research literature, while other objectives were obtained from the empirical data of the study.

Table 6.1 provides an illustration of the main research questions and objectives of this research study; it gives a brief description of how these objectives have been achieved.

Table 6.1: Reflecting on the main research questions and objectives

RESEARCH QUESTIONS	RESEARCH OBJECTIVES
1. What are the GSCM challenges that Unilever faces?	1. To determine the GSCM challenges that Unilever faces
2. What remedies does Unilever have in place to overcome these challenges?	2. To determine the remedies Unilever has in place to overcome these challenges
3. What are the benefits that Unilever derives from GSCM?	3. To determine what the benefits are that Unilever derives from GSCM

The next section of this chapter provides a summarised discussion of how each objective has been achieved and how each has contributed towards addressing the main research problem presented in the study.

6.2.1 Objective 1: Green supply chain management challenges that Unilever faces

The first primary objective of this study was to determine the GSCM challenges that Unilever faces. This objective was achieved through an empirical study conducted at the Unilever-Indonsa factory. The empirical study consisted of semi-structured in-depth interviews using an interview guide. The interview guide was drafted based on the conceptual framework derived from findings of the literature review in terms of the objectives of this study. An interview guide designed and used for the empirical field research is included as Appendix B.

The findings of this research indicate that the GSCM challenges can be categorised into four themes derived from the application of conceptual framework. These include green procurement challenges, green manufacturing challenges, green transportation challenges and product recovery challenges. Green procurement challenges include lack of knowledge and information sharing among partners and supplier reluctance to change to a green supply chain. Green manufacturing challenges include waste, capacity constraints and pollution, whereas green transportation challenges include carbon

emissions and diesel spillage. The high consumption of energy and water resources and the lack of knowledge on sustainability were identified as product recovery challenges. Other challenges indicated during empirical study include high initial investment and costs, limited visibility of supplier activities, poor communication, poor legislation on green procurement, lack of partnering with local suppliers and the information gap among managers.

The use of an environmental scorecard, auditing, KPIs, energy mapping, rainwater harvesting and bonuses and prices are some of main remedies to GSCM challenges.

6.2.2 Objective 2: Remedies Unilever has in place to overcome these challenges

The second primary objective of this study was to determine the remedies Unilever have in place to overcome GSCM challenges. This objective was achieved through semi-structured in-depth interviews conducted at the Unilever-Indonsa factory, along with a non-participant, structured observation in the factory. The observation checklist was drafted before commencing the observation in order to observe situations or events in relation to the researcher's specific objectives. A copy of the observation checklist is attached as Appendix C.

The empirical data indicated that remedies Unilever has in place to overcome green procurement challenges include the adoption of purchasing, alignment of green supply chain objectives with the business objectives and focusing on source reduction to reduce waste. Remedies to overcome green manufacturing challenges include promoting green manufacturing and using green supply chain analysis as a catalyst for innovation, an environmental scorecard, WCM, VSDs, bonuses and prices, auditing and financial planning, dust and noise control and product group development. The on-site leakage inspections and environmental KPIs are remedies to green transportation challenges. Lastly, to minimise challenges in product recovery, Unilever has initiated a number of strategies, which include rain water harvesting, energy mapping, motion sensor light switches and daily staff and executive management meetings.

6.2.3 Objective 3: Benefits that Unilever derives from green supply chain management

The third primary objective of this study was to determine what the benefits are that Unilever derives from GSCM. This was achieved through an empirical study at the Unilever-Indonsa factory. The findings of the empirical study indicate that the benefits derived at Unilever when adopting green supply chain can be categorised into financial benefits and non-financial benefits. Financial benefits include cost savings opportunities, whereas non-financial benefits include brand reputation, waste prevention and reduction, compliance to environmental legislation, better business practices and competitive advantage.

The following sections discuss the recommendations to overcome the identified challenges, the limitations of the study and areas for further research.

6.3 RECOMMENDATIONS

The primary aim of this study was to identify and determine the GSCM challenges that Unilever faces and how these can be overcome. Chapter 5 presented the results of the analysis of the data obtained from the semi-structured in-depth interviews and observations and discussed the findings. This section includes recommendations on how these challenges could be addressed. This section provides a list of the identified GSCM challenges (from both the literature and the empirical study) and the recommendations on how these challenges could be addressed.

Table 6.2 presents green procurement challenges and recommendations followed by a brief discussion of possible outcomes when adopting recommended remedies.

Table 6.2: Green procurement challenges and recommendations

Literature findings	Empirical findings	Recommendations
The literature discussed potential green procurement challenges in the FMCG industry. These are briefly recapped as follows: • Lack of knowledge and information sharing between upstream and downstream partners (Beamon 2008:47; Zhu, Sarkis & Lai 2008:85). Supplier reluctance to change towards GSCM (Sage 2010:137). • Information gap among managers (Kumar & Chandrakar 2012:52). Lack of social concerns (Digalwar & Metri 2010:115). • Poor Legislation on green procurement (Ravi & Shankar 2012:37).	The following are the main green procurement challenges identified during interviews with participants at Unilever-Indonsa factory. • Lack of knowledge and information sharing between upstream and downstream partners (Section 5.6.1) • Lack of partnering with local suppliers (Section 5.6.1.1) • Poor communication (Section 5.6.1.2) • Limited visibility to supplier activities (Section 5.6.2.1).	• Unilever could engage suppliers in sustainability programmes and strengthen their partnership with the local farmers. • It could be made mandatory for suppliers to report regularly on their greening initiatives in order to enhance visibility over supplier activities. It is also important to make sure that suppliers gain economic returns from adopting green supply chain so that they will see a need to participate in greening initiatives. • Sustainability practices should be incorporated into supplier support

Possible positive outcomes that could be obtained if the recommendations were to be implemented include improved supplier relationship, reduced reluctance to change toward green supply chain, and clear visibility to supplier activities.

Table 6.3 presents green manufacturing challenges and recommendations followed by a brief discussion of possible outcomes when adopting recommended remedies.

Table 6.3: Green manufacturing challenges and recommendations

Literature findings	Empirical findings	Recommendations
The literature discussed potential green manufacturing challenges in the FMCG industry. These are briefly recapped below: • Lack of IT implementation (Hui Ho, Shalishali, Tseng and Ang 2009:83), • Organisation's Reluctance to adopt technology advancement (Cooper 2011:36), Market competition and uncertainty (Hosseini 2007:23), Lack of implementing green practices (Morelli 2011:31), Lack of top management commitment (Sarkis 2009:39), • High initial investment and costs • Lack of customers awareness and demand (AlKhidir & Zailani 2009:47).	The following are the main green manufacturing challenges identified during interviews with participants at Unilever-Indonsa factory. • Waste, Lack of energy generation capacity, High initial investment and costs, and • Pollution (ground, water, air, noise).	• Unilever could ensure source reduction, waste prevention or pollution prevention by eliminating waste before it is created. • Existing production equipment and utilities could be modified, for instance, by adding measuring and controlling devices in order to run the processes at higher efficiency and lower waste and emission generation rates.

Possible positive outcomes that could be achieved if the recommendations were to be adopted include reduced waste, pollution and overhead costs, savings in time and money and increased competitiveness. Better economy could be achieved as additional costs for maintaining a pollution free environment would be reduced.

Table 6.4 presents green transportation challenges and recommendations followed by a brief discussion of possible outcomes when adopting recommended remedies.

Table 6.4: Green transportation challenges and recommendations

Literature findings	Empirical findings	Recommendations
The literature discussed potential green transportation challenges in the FMCG industry. These are briefly recapped below: • Poor quality of human resources (Yu Lin & Hui Ho 2009:39). and • Lack of Government support systems. (BearingPoint 2008:74; Scupola 2009:154; Lee & O'Marah 2011:138; AlKhidir and Zailani 2009:34).	The following are the main green transportation challenges identified during interviews with participants at Unilever-Indonsa factory: • Carbon emissions (Section 5.8.1.1.) • Diesel spillage (Section 5.8.1.2) • Challenges with regards to changing employee behaviour (Section 5.8.2.1) • Lack of government support systems (Section 5.8.2.3).	• Unilever could minimise carbon emissions by receiving and accommodating orders according to economies of fleet sizes to load vehicles to maximum capacity because, if vehicles are under loaded, this results in unused leading to multiple trips and more carbon emissions. Therefore, pallets can be double staked in order to achieve a full truck load freight shipping to fill up the entire truck, thus avoiding doing many trips. Using the most direct route, prevent spillages, improving aerodynamics of the vehicle and using fuel efficient trucks.

Possible positive outcomes that could be achieved if the suggested recommendations were to be implemented include reduced carbon emissions and transportation cost at Unilever-Indonsa factory.

Table 6.5 presents product recovery challenges and recommendations followed by a brief discussion of possible outcomes when adopting recommended remedies.

Table 6.5: Product recovery challenges and recommendations

Literature findings	Empirical findings	Recommendations
The literature discussed potential product recovery challenges in the FMCG industry. These are briefly recapped below: • Costs related to product recovery (Pollock 2010:8), • Customers' negative perceptions about remanufactured products (Riedel, 2004:1; Dampier, 2006:22), • Lack of organisational encouragement (Tsai & Ghoshal 2008:114), • Lack of markets for recovered products (Evans & Denney 2009:16; Kumar & Chandrakar 2012:98).	The following are the main product recovery challenges identified during interviews with participants at the Unilever-Indonsa factory: • High energy consumption (Section 5.9.1.1) • High water consumption (Section 5.9.1.2) • Lack of sufficient knowledge about environmental sustainability (Section 5.9.1).	• Unilever could use thermal container liners instead of refrigerated trucks and low voltmeter lights in order to save electricity and protecting the environment. • Also, monthly training programmes could be established to provide a knowledge-sharing platform regarding GSCM activities such as saving water. • Unilever could use slip sheets instead of pallets as these are environmentally-friendly, hygienic, wood-free, light and easily recyclable. Unilever could also invest in generating solar energy and use green heating and cooling systems that run on solar power.

Possible positive outcomes that could be achieved if the suggested remedies were to be implemented include improved employee encouragement and motivation to participate in greening initiatives. Reduced waste in the entire value chain and improved conservation of energy and water.

6.4 LIMITATIONS OF THE. STUDY

The limitations of this study are outlined as follows:

(i) Only one company in the FMCG industry (Unilever) was included in this study. Other FMCG companies operating South Africa did not partake of this study. Therefore, the findings of this research cannot be generalised to all companies in the FMCG sector in South Africa.

(ii) GSCM challenges were identified through the literature review and semi-structured in-depth interviews with participants at Unilever in the supply chain department. It is suggested that not all challenges in the green supply chain may have been identified.

Areas for future research are dealt with in the next section.

6.5 AREAS FOR FUTURE RESEARCH

The following possible research focus areas were identified by the researcher during the course of this dissertation. These focus areas within the broader topic of GSCM could provide more insight into the GSCM challenges in the FMCG industry in South Africa.

- The perception that the initial investment and costs for implementing green supply chain initiatives is high and return on investment is low with a long payback period is a strong challenge to the adoption of green supply chain practices. Therefore, more research and studies could be undertaken using an appropriate set of green supply chain performance metrics and cost/benefit analysis of successful greening projects as case studies to dispel this perception and remedy the challenge.
- Lack of government support was also cited as a challenge to the adoption of GSCM initiatives. Therefore, research and studies could be undertaken on possible incentives and support that government can provide to encourage FMCG companies, suppliers and customers to adopt greening practices.
- The FMCG companies are the main link between suppliers and customers and therefore in a position to play a critical role in driving green supply chain initiatives in the total supply chain. FMCG companies should therefore be encouraged to participate in similar studies on a specific basis in order to establish a database of greening practices in the local FMCG industry. This database can then be used to

continuously monitor greening trends in the industry and to serve as a resource for future study purposes.

- It is also suggested that further research be undertaken to include all role players in the FMCG industry and identify green supply chain challenges facing all role players both upstream and downstream of the supply chain. Alternatively, a similar study could be conducted in a different sector to determine whether industries in South Africa are facing similar green supply chain challenges.
- There are some challenges that were identified in the literature but did not surface during the study. Also there were challenges identified in the empirical research that were not found in the literature. Therefore it is essential to make connections between literature and empirical study in order to find common ground.

6.6 CONTRIBUTION OF THE RESEARCH STUDY

The research study contributes to the application of GSCM theory in the FMCG industry, with particular emphasis on green supply chain challenges experienced at the Unilever-Indonsa factory. The green supply chain challenges identified in the study have a significant impact on the competitiveness of Unilever, who plays a key role in the South African FMCG industry and the overall economy.

Recommendations were made to Unilever and the FMCG industry as a whole as to how the challenges that were identified could be overcome. These recommendations could be further developed in future research studies.

The field of GSCM is dynamic; thus the study of the literature and the findings of this research make a contribution to the body of knowledge and provide new insight into this field.

6.7 CONCLUDING REMARKS

This study can be classified as both descriptive and exploratory. Through the literature research, it was established that South African FMCG companies face green supply chain challenges. This was further evidenced in the interviews with executive/senior management during empirical study at Unilever.

Chapter 6 started by reflecting on the main research objectives and questions of the research study as these formed the basis of this research study. In addition, this chapter provided a list of the identified GSCM challenges (from both literature and empirical study) and recommendations on how these challenges could be addressed (refer to Table 6.1). This chapter also discussed limitations of the study, areas for further research in the similar subject matter and contribution of the research study.

The findings indicated that Unilever faces challenges in green procurement, green manufacturing, green transportation and product recovery. This chapter provided recommendations on how to overcome these challenges, such as strengthening partnership with the local farmers in order gain better view of their sustainability activities and to initiate support and development programs. Unilever could also derive green manufacturing benefits by ensuring waste prevention and source reduction. Loading maximum capacity of vehicles and improving vehicle aerodynamics was also recommended to reduce trips, thus minimising carbon emissions. It would be beneficial to ensure route planning and to use fuel efficient trucks to overcome green transportation challenges. To minimise energy consumption challenges, Unilever could use low energy light and thermal container liner instead of refrigerated trucks. In addition, more investment could be made with regard to generating solar energy and facilitation training programs to transfer knowledge of environmental sustainability.

Benefits derived by Unilever from adopting a green supply chain can be categorised into financial benefits and non-financial benefits. Financial benefits include cost savings opportunities, whereas non-financial benefits include brand reputation, waste prevention and reduction, compliance with environmental legislation, better business practices and competitive advantage. The environmental scorecard, auditing, KPIs, energy mapping, rainwater harvesting and bonuses and prices are some of main remedies to GSCM challenges.

Whilst there are numerous GSCM challenges faced by the South African FMCG industry, companies such as Unilever are constantly implementing strategies to overcome these challenges.

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APPENDIX A:

ETHICAL CLEARENCE LETTER

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

17 July 2015

Mr Mandla Mvubu (211506280)
School of Management, IT & Governance
Westville Campus

Dear Mr Mvubu,

Protocol reference number: HSS/0919/015M
Project title: Green Supply Chain Management challenges in the South African Fast-Moving Consumer Goods Industry: A case of Unilever

Full Approval – Expedited Application

In response to your application received on 10 July 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: Professor MJ Naude
Cc Academic Leader Research: Professor Brian McArthur
Cc School Administrator: Ms Angela Pearce

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
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APPENDIX B:

CONSENT LETTER AND INTERVIEW GUIDE

UNIVERSITY OF KWAZULU-NATAL
School of Management, IT and Governance

Dear Respondent,

M Com Research Project

Researcher: Mandla Mvubu (073 135 8995)

Supervisor: Professor Micheline Naude (033 260 6181)

Research Office: Ms. M Snyman (031 260 8350)

I, Mandla Mvubu, am currently a Master of Commerce student in the School of Management, IT and Governance at the University of KwaZulu-Natal. You are invited to participate in a research project titled:

Green Supply Chain Management Challenges in the South African Fast Moving Consumer Goods Industry: A Case of Unilever.

The findings of this study will provide insight into the green supply chain management challenges that Unilever faces and how Unilever overcomes these challenges. Suggestions will also be made on how the identified challenges can be remedied. As the field of green supply chain management is dynamic, it is envisaged that the study of literature and the findings of this research will contribute to the body of knowledge and provide insight into this field.

Your participation is voluntary and you may withdraw from the project at any time should you wish. Confidentiality and anonymity of records identifying you as a participant will be maintained by the School of Management, IT and Governance, UKZN.

Should you require, I can make a summary of the findings available, once the study is complete. Should you have any questions or concerns about participating in this study, please contact me or my supervisor at the numbers listed above.
It is estimated that it will take approximately 45 minutes to complete the interview. Your participation will be appreciated.

Yours sincerely

MANDLA MVUBU (MR)

UNIVERSITY OF KWAZULU-NATAL
School of Management, IT and Governance

M Com Research Project

Researcher: Mvubu Mandla (073 135 8995)

Supervisor: Professor Micheline Naude (033 260 6181)

Research Office: Ms. M Snyman (031 260 8350)

CONSENT

I_____ (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

I consent / do not consent to having this interview audio- recorded.

_____ _____

Signature of Participant Date

INTERVIEW GUIDE

Date: _____

Company: _____

Person interviewed (optional): _____

Capacity: _____

INTRODUCTION

The introduction explains the purpose of the study and the role of the participants. In addition, the aim is to assure the participants' confidentiality and request permission to use a tape recorder. (Interviewer will explain in detail prior to the interview commencing)

SECTION 1 COMPANY PROFILE

- What is the total number of employees in Unilever's factory at River Horse Valley?
- Describe the organisational structure of this factory
- Is the decision making in Unilever's factory at River Horse Valley, centralised or decentralised?
- Does this status affect the manner in which the factory operates?

SECTION 2: GENERAL

The aim of this section is to ascertain from the participant what he or she perceives to be the green supply chain challenges that Unilever faces and what remedies Unilever has in place to overcome these challenges.

- What do your understanding about green supply chain management?
- Are you involved in any green supply chain initiatives?

- What part of the supply chain are you concerned about with regards to environmental sustainability?
- In what part of the supply chain do you derive benefits when adopting green supply chain management?
- With the initial investment costs of implementing green supply chain, does this have negative impact on the success of your greening initiatives?
- If so, what remedies do you have in place to overcome this challenge?

SECTION 3: GREEN PROCUREMENT

- Are you involved in any green procurement initiatives?
- How would you categorise the materials you procure (e.g. raw materials, WIP or finished goods)?
- Do you procure your materials from sustainable suppliers?
- Is the lack of knowledge and information sharing between upstream and downstream partners a challenge at Unilever?
- If so, how do you overcome this challenges?
- Is it your aim to make sure that your suppliers comply with Unilever's environmental policies? Why? How?
- What benefits do you derive from green procurement?
- With scrutiny from government and environmental advocacy groups, what impact will this have on your procurement activities?
- What are major green procurement challenges you face?
- What remedies does Unilever have in place to overcome these challenges?

SECTION 4 GREEN MANUFACTURING

- Are you involved in any green manufacturing initiatives? Explain, if so
- What part of manufacturing are you concerned about with regards to environmental sustainability?
- What have been some of the investment costs of implementing green manufacturing?

- What benefits do you derive from adopting green manufacturing?
- How have you reduced the emission of green gasses?
- Do you market or publicise your green manufacturing initiatives?
- How do you ensure that the green manufacturing objectives are aligned with the business objectives?
- Are there mechanisms in place to evaluate or assess green manufacturing activities? If yes, please elaborate.
- What challenges do you face when monitoring the activities related to manufacturing?
- If so, what mechanisms do you have in place to overcome these challenges?
- Is it your intention to ensure the elimination, prevention and minimization of wastage throughout manufacturing? (for example, water and energy savings, process waste etc.)
- Is this in line with the company's Corporate Social Responsibility (CSR)?
- Is information technology (IT) incorporated in your manufacturing equipment?
- If yes, what kind IT is used during manufacturing?
- How do you determine when to upgrade to a new model of machinery or equipment?
- With intensified competition and uncertainty in the global market, how do greening manufacturing activities provide you with a competitive edge?
- To what extent is top management committed towards green manufacturing activities?
- What are some of the cost savings opportunities you have derived from adopting greening practices in manufacturing?
- What is the resulting impact of manufacturing environmentally friendly products towards demand?
- What are the major manufacturing challenges you face (from environmental sustainability viewpoint) which have not been addressed?
- How do you overcome these challenges

SECTION 5 GREEN TRANSPORTATION

- Are you involved in any green transportation initiatives?
- What part of transportation are you concerned about with regards to environmental sustainability?
- What advantages do you derive from green transportation?
- With increasing global concern about the impact of distribution activities on the natural environment, how do you ensure you meet the green transportation objectives?
- What are the major transportation challenges you face (from environmental sustainability viewpoint)?
- How do you overcome these challenges?
- Are you able to change your current transportation mode from road to rail?
- If so, what impact will this have on your current stock holdings?
- What impact will this have on JIT deliveries?
- What is the nature and scope of the training of staff members on green transportation?
- Do transportation staff members receive incentives to participate in greening activities?
- What is the extent of government support to effectively implement green transportation?

SECTION 6 PRODUCT RECOVERY

- Are you involved in any initiative related to product recovery?
- What are major challenges you face in product recovery?
- How do you resolve these issues?
- What opportunities do you derive from product recovery?
- Is it your aim to align product recovery activities with the overall business objectives?
- Will this provide a better view to monitor activities related to product recovery?
- Will this support company's Corporate Social Responsibility (CSR)?

- If so, what impact will this have on energy utilisation?
- What impact will this have on water utilisation?
- Is it your aim to enhance communication and knowledge sharing among employees?
- Will this encourage employees to participate in the recovery of energy and water?
- With high initial investment costs for recovering water and energy, how do you overcome this challenges?

Any other comments you would like to make?

THANK YOU FOR YOUR TIME

APPENDIX C:

OBSERVATION CHECKLIST

OBSERVATION CHECKLIST

OBSERVER: MR. MANDLA MVUBU

PLACE: UNILIVER'S INDONSA FACTORY, RIVERHORSE VALLEY

DATE: 21/08/2015 TO 10/09/2015

This observation checklist was designed to be completed by the researcher to ascertain whether process, equipment and materials at Unilever's Indonsa factory conforms to green supply chain management practices. The observation focuses on building design of Indonsa factory, green procurement, green manufacturing, green transportation and product recovery.

Observer Instructions: Place a checkmark (√) for each episode of the following factors. Make note of the significant events or factors under the comment section at the bottom of the form.

Activity		Please tick (√)		
		YES	NO	N/A
6	**Building design of Indonsa factory**			
6.4	Indonsa factory is designed to ensure efficient use of resources such as energy, water and raw materials.			
6.5	Sustainable designed warehouse to reduce operation costs and environmental impacts, and increase building resiliency.			
6.6	Indonsa factory is designed to maximize the use of renewable energy sources.			
6.7	Indonsa factory is a sustainable building that uses water efficiently, and reuse or recycle water for on-site use.			
6.8	Building material prevents upstream pollution, and conserves resources. Building is also designed to use and reuse materials in the most productive and sustainable way across its entire life cycle.			
6.9	Indonsa building maximizes daylighting, has appropriate ventilation and moisture control, optimizes acoustic performance, and avoids the use of materials			

	with high-greenhouse gas emissions.			
6.10	The following characteristics describe/do not describe Indonsa factory:			
	• Careful building design to reduce heat loads, maximising natural light and promoting the circulation of fresh air.			
	• Energy-efficient air conditioning and lighting.			
	• Using environmentally friendly, non-toxic materials.			
	• Reducing waste and using recycled materials.			
	• Water-efficient plumbing fittings and water harvesting.			
	• Using renewable energy sources			
7	**Green Procurement**			
7.4	Purchased recycled paper is used to make packages for the four product categories (i.e. Knorr, Robertson's, Knorrox, and Rajah) at Indonsa factory, as these generally have a much lower impact on the environment.			
7.5	Order merchandise with minimal packaging, in concentrated form, or in bulk.			
7.6	Suppliers do not over package orders.			
7.7	Purchased materials are suitable for easy biodegrading since they can break down speedily and safely.			
7.8	Products made up of different types of materials, particularly plastics and metals, are designed to be easily taken apart or disassembled so that the materials can be recycled.			
7.9	Indonsa factory ensures that purchased materials does not have a 'knock-on' effect of using more resources since it uses hand-driers over towels which may			

	decrease the volume of paper disposed.			
7.10	Indonsa factory purchased long-life equipment, that will survive being mistreated, that can be repaired, reused and ultimately recycled. Enable to be upgraded and improve performance over time rather than having to buy new equipment to do the same job.			
8	**Green Manufacturing**			
8.4	The use of biodegradable and recyclable packaging material such as paper and cardboard, items made from corn starch, bubble wrap, and biodegradable plastic.			
8.5	Waste is avoided in packing area.			
8.6	Optimised use of refrigeration and chilling.			
8.7	Lights are switched off in refrigeration areas when not in use			
8.8	Refrigeration doors are kept closed to prevent cool air from escaping.			
8.9	Manufacturing machinery and equipment is upgraded or replaced (every after one year).			
8.10	Overcooling is prevented to minimise energy costs and improve efficiency			
8.11	Indonsa factory uses manufacturing machines that are in good working condition and certified as environmentally sustainable.			
8.12	Promoting green cleaning and recognising safer consumer and industrial and institutional products through safer product labeling.			
8.13	Improved technology and design tactics to expand the scope of products and incorporating eco-efficiency into design tactics.			
8.14	Cooling system using of water chillers works efficiently.			

8.15	Chillers are witched off when not required through automatic controls.			
8.16	Indonsa factory invest in equipment of high quality, durable, and repairable to minimise waste and reduce costs.			
9	**Green Transportation**			
9.4	Ordered materials are shipped in returnable containers			
9.5	Mininised movement and waste that occurs when temporarily locating, filing, stocking, stacking, or moving materials, people, tools, or information.			
9.6	In a warehouse, travel time and movement of people and materials by forklift (material handling) is measured and evaluated.			
9.7	Indonsa factory uses plastic pallets for handling materials rather than wooden pallets.			
9.8	Indonsa factory uses battery operated forklift trucks instead of liquefied petroleum gas (LPG).			
9.9	There are no LPG gas leakages in the delivery trucks and forklift trucks.			
10	**Water, Energy and Waste Recovery**			
10.4	Use of environmental sustainable technological equipment to collect water.			
10.5	Use of environmental sustainable technological equipment to treat water.			
10.6	Recovering energy sources and using equipment that consume less energy and release less greenhouse gases into the environment.			
10.7	Refuse Derived Fuel (RDF) or solid recovered fuel waste is used to produce energy.			
10.8	Indonsa factory facilitates the recycling and reusing of waste material by separating, collecting and			

	remanufacturing or converting used or waste products into new materials (e.g. paper, plastic, and glass).			
10.9	Foam packaging pellets and cardboard boxes are reduced, recovered, reused and recycled.			

OBSERVER'S COMMENTS: